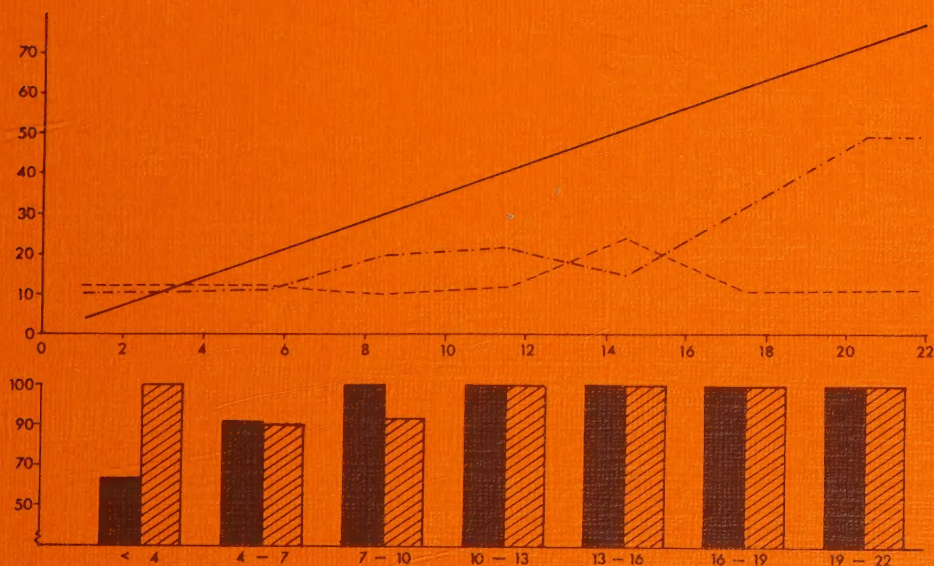


DYNAMIC PROCESSES OF DEVELOPMENT IN MARGINAL AREAS

GIRMA YADETA



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DYNAMIC PROCESSES OF DEVELOPMENT
IN MARGINAL AREAS

A case study from the Pokot of
North West Kenya

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Abstract In this research project, it is argued that the contemporary pastoral nomads or agro-pastoral nomads, particularly those located in the transitional zone between the arid and fertile rural lands, are in the process of intensifying or packing their activities. The main factor which is an impetus for this course of development seems to be the exertion of population pressure. Which is actually a result of natural population growth, immigration and change of land policies. The adoption of innovations (e.g introduction of new rules of tenure, changes in technique of agro-livestock activities, investment in infrastructures etc..) and other remedies for these problems, in turn have created new opportunities and constraints which nowadays have encouraged even more the continuation of the process of intensification. In other words, the traditional spatial organization of such societies has been eroded. Therefore, the theme of this study is to find out the existing constraints and opportunities which guide the on-going process of change among socio-economic units(single or extended households) and the role of population pressure in such dynamic circumstances. Finally, there is an endeavour to suggest how such societies in marginal regional spaces should be organized, the task of the government in question and planners.			
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DYNAMIC PROCESSES OF DEVELOPMENT IN MARGINAL AREAS

*A CASE STUDY FROM
THE POKOT OF
NORTH WEST KENYA*

by

GIRMA YADETA



1985

THE ROYAL UNIVERSITY OF LUND, SWEDEN
DEPARTMENT OF GEOGRAPHY

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PART I INTRODUCTION



1 GENERAL BACKGROUND AND AIM

INTRODUCTION

Since the beginning of the sixties, with each appraisal of the problems of development processes in marginal areas of developing countries of Africa and Asia, there has been increased awareness of the complexity and of the many essential variables that must be taken into account in planning and formulating policies of marginal regional spaces. Particularly pastoral nomadism is a subject extensively studied by people of different professions, for example, colonial administrators, ethnologists, anthropologists, geographers, ecologists etc... albeit, the anthropological studies clearly predominate the others. Consequently, it is a subject immensely rich in literature.

Since detailed discussions of these various studies have been already presented both by Dyson-Hudson N. (1972) and Oxby (1975), I do not intend here to review all these works. Instead, I will pay more attention to those aspects of these studies which have relevance to practical planning policies and to aspects relatively neglected by these scientific disciplines. Some of the important facts extracted from earlier studies will also be raised, alongside the various forth-coming discussions in this study.

It seems that the geographers who contributed to the old literature, paid a high degree of attention to mapping and recording the mobility of pastoral nomads and their herds, in order to depict ideal types of spatial movements of a given tribe or sub-tribe etc... The anthropologists also emphasized phenomena observations per se, and categorizations interpreted basically in terms of kinship, social organization, and custom law.

Moreover, there is a clear tendency among earlier anthropological studies, to relatively neglect demography

* In certain developing countries, the marginal areas could be inhabited by a small number of people who are engaged in hunting and gathering, besides pastoral nomads, agro-pastoral nomads and settled farmers. In this study, I have considered in the analysis only the latter group.

as explanatory factors in social organization and cultural development. Perhaps, it may be due to the fact that their studies emphasized the pastoral nomadic values and attitudes and classifications of social units. In the last two decades, however, several studies have appeared which have given due consideration to population density, size of labour as part of explanatory factors (Barth 1961, 1964, 1969, Dyson-Hudson R. 1972, Dyson-Hudson N. and R. 1970, Bates 1972, Pehrson 1966, Dahl and Hjort 1979).

According to Brookfield, it is the inclination towards assessing the ecological environment, which has established a wide field of common platform between human geographers and social and cultural anthropologists. The geographers' awareness of social and cultural factors in their effects on the location and distribution of phenomena, and the social and cultural anthropologists' interpretation of social organization, kinship reflecting the interplay of both social and natural factors. Subsequently, the evaluation, allocation of land, human resource (or human-time) and its organization as bundles with other resources e.g. tools, artifacts etc... and the process of various operations of an activity system, have become a matter of interest to both disciplines (Cf. Brookfield 1968:414-14). Therefore today it has been more or less accepted among researchers of these two disciplines to borrow ideas from each other.

In my opinion, the works of Barth of the late fifties and sixties are a real break through. Barth in many of his studies, rather than stressing the pattern of spatial behaviour and organization as an ideal behaviour of a tribe or sub-tribe, focused on assesment of the causal factors for such behaviour. He found out that various factors can create multitudinous pattern and processes of operations, irrespective of the level of aggregation of a social group. For instance in one of his works he said:

"A consideration of the systematic relations of niches and populations, the constraints of ownership forms, and the variations in capital and labour resources between households, will explain what seems initially a most bewildering pattern of movements (Barth 1964:21)"

As a result, his analysis considers not only the ecology, social and political organizations of the pastoral

nomads, but it includes as well the influences of the neighbouring sedentary farmers, the implications of partly adopting crop farming by pastoral nomads etc... in one context (Barth 1961, 1962). His article on "The Land-uses Pattern of Migratory Tribes of South Persia" (Barth 1959-60), undoubtedly intrigues geographers. He argues that the different herdsmen of the tribes of South Persia are similar to railway-schedule analogy, in which trains have different departure and destination stations within the same railway network, and need accurate organization and ordering of operations in sequences in time and space in order to avoid traffic jams (Ibid:5). Thereby he indicated the authority constraints (or rules of tenure) which allocate spatial room of biotic food-webs and control the duration of every socio-economic unit in the different spatial rooms existing in the total environment, as essential constraints having a significant effect on the organization and performance of the activities of the pastoral nomadic people in question. His study on social change (1967) as allocation of time and resources, would be interesting to human geographers who advocate the time-geography model.

Today, there are many social anthropologists who seem somehow to have adopted the approach of Barth. Among these, Dyson-Hudson R. (1972), Haaland (1977), Paine (1964, 1972), Sörbo (1977) etc..

Geographical works also show inclination away from only the mapping of the movement of pastoral nomads. Some recent studies have given a profound insight into the bonds between men, domestic animals and the physical environment. These studies also focus on the economic life of pastoral nomadic societies in terms of bio-physical environment, social values and political conditions. Among these works on pastoral nomads, are Toupet (1963) on Mauritania, and Johnson (1969), a comparative studies on S. Asian and N. Africa pastoral nomadic communities. His study on "The Status of Pastoral Nomadism in the Sahelian Zone" is even more interesting because it deals not simply with types of spatial mobilities in large socio-economic units at the aggregate level, but he even indicated how contemporary constraints and opportunities have affected the organizations of livestock rearing and crop farming of pastoral nomadic families in Eastern Libya covering a period from 1965-70 (Johnson 1975:80-83). In other words, by arguing about facts, which cover both the events of the past and recent development, he depicted essential

constraints that should be given high consideration in practical planning. Gig (1963) on Chad, Gallais (1975) proposal to Malian government on problems of its marginal areas, Bernus (1974) on the recent evolution of the relation between pastoral nomads and sedentary agriculturalists in tropical Africa, are some of the contributors of the geographical studies worth mentioning.

The ethnologist Swift's essays on the Tuaregs of Mali (1973, 1975, 1978) and who followed an approach similar to the French geographers, has contributed very useful material that can be used by human geographers.

Undoubtedly, there is plenty of material full of ideas. However, due to lack of a good theoretical foundation, these manifold studies are uncoordinated and analysed in multitudinous ways. Naturally, the result is an accumulation of scattered knowledge on the behaviour of pastoral nomadic societies (Dyson-Hudson 1972). This is even manifested in the inconsistent definitions of pastoral nomadism, used in practically all literature available.

Furthermore, few seem also to realize the extent of the former pastoral nomadic people who have not only adopted cultivation, but have expanded and have begun to intensify cultivation and have reduced livestock to a certain extent. The same people are demanding expansion and improvement of existing limited infrastructures, and job opportunities in view of rapid population growth.

These parts of marginal areas have so far been given little attention or neglect by contemporary researchers. On the other hand, such areas are the core for innovations. They can enlighten us on the constraints and opportunities which prevail during the course of this development. At the same time, it may give us profound information on why others in the same areas resist change. Hence, the change in pastoral nomadism, that is, the shift towards agro-pastoral nomadism, mixed-farm or ranch, badly need analysis with further depth, if it is to be used as basic material for planning development projects.

PROBLEM SETTING

At present, there are sufficient general ideas which are flowing from various directions. These ideas are actually the result of a patch-work of old events and some recent general observations. Still, reliable statistical surveys of nomadic societies are difficult to find, particularly

at micro-level. All accessible population census are often incomplete when it concerns a marginal area. Consequently, most of the water development projects, dip constructions, the programme of land adjudication etc... which were introduced recently in these zones, are more or less projects which are based on partial information. Often, if efforts are made to inquire about, for instance, the number of livestock which utilize the newly drilled water source, it is virtually impossible to get an accurate answer.

Obviously, one cannot deny that the collection of demographic data under the conditions of pastoral nomadic "stricto sensus", is a tedious and costly task and the result may be useful only temporarily for a specific period.

In spite of these difficulties, there are aspects of the present development process of marginal areas that need our attention. Practically, in all marginal areas, there is a consensus among researchers about the growth of pastoral nomadic or agro-pastoral nomadic population, albeit the general rate of growth is said to be lower in relation to the population growth of the more fertile rural zone e.g. Somalia has a growth of population of 2 per cent annually (Konczacki 1978:74). Nevertheless, in certain countries, the rate of growth is comparable to the fertile rural zone e.g. in Kenya, the rate of annual growth is 3 per cent for both Kitui and Machakos between 1969-77 (M.O.A/marginal Semi-arid Land Pre-investment Inventory Report no. 6 pp. 4), Baringo district has increased by 3.9 per cent annually between 1962-69 (ibid:89), West Pokot has a rate of population growth of 3 per cent (M.O.A:West Pokot Land Development Division 1980:2).

This growth is justified partly by natural growth due to better health and other services, partly by encroachment of outsiders in their domains and finally by the introduction of new land policies, both by the colonial and post-independence governments. Its subsequent effects, that is, scarcity of land resource and the relative increase of land value, adoption of new innovations e.g. crops cultivation, new techniques in crop and livestock farming, dependence on modern economic and social services etc... have created various new constraints and opportunities. These are today an impetus of great magnitude for the furtherance of on-going processes of packing or intensification of the activities of the people concerned in multitudinous patterns.

Therefore, it is plausible to say, there are a series

of socio-economic units (single or extended households) which have reached different levels of intensification. This infers, when I discuss the higher intensification of the activities system of a given socio-economic unit in such areas, that I am solely raising an issue of the relative difference of an on-going process of intensification. For, we should be aware that the pastoral nomads of the early twentieth century are no longer today in the same circumstances. This process of development had been noted in the sixties by a veteran geographer on this subject:

"Dans de nombreuses regions du Sahara, nous assistons à un processus identique: au debut il y a diminution du troupeau Camelin et reduction des parcours, stationnement prolongé des pasteurs à l'oasis, peu à peu la transhumance des troupeaux se substitue au déplacements de la tribu, finalement la maison remplace la tente et les hommes cherchent des ressources nouvelles sur les chantiers ou dans la culture..... Du Sud Marocain au desert occidental d'Egypte les meme faits se reproduisent un peu partout" (Capot-Rey 1961:82-83).

However, for a research oriented as an aid for planning or policy-makers, the interest is not simply to record the unprecedented recent changes per se, but also to find the impetus and constraints which govern the processes of these developments. Hence, analysis of some depth is needed.

At this juncture, I believe that it is fruitful to select sampling bases from those locations occupied by people who have already established fixed dwellings due to the constraints mentioned above.

The advantages of selecting such locations are twofold- the spatial mobility of human population is relatively restricted, facilitating the task of undertaking a survey in the specific spatial location and such sampling bases will as well give us room to consider and take into account all crucial internal and external constraints of our time. Moreover, since every event has its roots in past situations (Hägerstrand 1970), one has to map not only the actual circumstances, but also the need to integrate it into its previous situation in order to clearly grasp the conflicting events. Besides, the efforts to integrate events into their previous situations broaden our knowledge on socio-economic units which are in the lower hierarchy

of intensification process.

All in all, such an approach will undoubtedly permit me to depict all the constraints and opportunities which guide each socio-economic unit to make a rational choice in relation to the possibilities offered, and I may even venture to suggest how such societies in marginal regional zones should be organized, the task of a given government and planners. Finally, it is my anticipation that the findings would be a stepping-stone to future research works.

AIM AND SCOPE OF THE STUDY

The objective of this study, therefore, is to depict the constraints and opportunities which prevail in marginal areas while the people endeavour to intensify their activities and change the quality of their life under the continuous growth of population pressure. In such circumstances, the ultimate goals of socio-economic unit(s) could be the creation of a mixed small-farm (s), or a ranch(s).

Hence, the premise can be formulated in the following way:

As in all societies of fertile rural areas, is population pressure by itself (a result of population growth per unit area relative to existing resources) a potent factor in triggering off changes in techniques of agro-livestock farming activities in marginal areas ? or does it pre-require some external stimulants which exert simultaneously its influence alongside population pressure ?

In testing this premise, there is a need for some kind of theoretical framework to formulate the various ideas in a discernable fashion. Part II covers this aspect of the study which is broken down into the following sections, chapter 2 deals with a relevant model and theories. The inconsistent definitions of pastoral nomadism, semi-nomadism and transhumance, which have led to confusion, are raised and discussed in detail in chapter 3, and a clear background for further discussion is presented. This chapter is a slightly modified version of the published article entitled "On the concept Pastoral Nomadism from a time-geographic perspective" (Yadeta 1978). Chapter 4 assesses the packing or intensification processes

from a general pastoral nomadic to agro-pastoral nomadic circumstances and finally, to a more intensive land-use system such as mixed farming or ranching.

Part III deals with the case study. The first three chapters provide general information on the background of the technical socio-ecological environment, revealing the extent of population pressure and the possible responses adopted as subsequent actions. The attributes of a farm, that is, the human resource, livestock resource, and cultivated land resource are raised separately in chapter 8. The management system is scrutinized in relation to, rules of tenure, farm organization and performance, and structure of incentives in chapter 9, 10, and 11. Conclusions and suggestions are presented in the last chapter.

PART II APPROACH OF THE STUDY

2 RELEVANT MODELS AND THEORIES

FEATURES OF PASTORAL NOMADISM

A notable feature of pastoral nomadism is by nature the most dynamic live-supporting activities system. All living and non-living resources subjected to these activities are in a state of motion. Pasture and water are distributed in a scattered pattern in space and their availabilities are variable in a time dimension. The biotic food-webs and water sources which are abundantly accessible in certain months of the year, may solely exist in one or two spatial locations in other subsequent months.

As a result, the human population organizes the operation of its activities system in sequence, following particularly the distribution of water and pasture in time and space. Today, such circumstances are made even more complex by changes incited both internally and externally.

Surprisingly, most of the models applied in the old literature by geographers or social anthropologists are better tools for assessing static rather than dynamic conditions. The interest in static models is not actually common, only in relation to studies of marginal areas, but all rural areas of developing countries have been suffering from the same approach.

Therefore, any studies oriented to practical planning with regards to pastoral nomadism should look for a model which is capable of taking into account the dynamic nature of pastoral nomadism.

One of the models in the field of human geography, which has such a dynamic approach and concepts which can enlighten us on on-going changes in the socio-technical ecological system of pastoral nomadic or agro-pastoral nomadic socio-economic units, is Hägerstrand's time-geography model of society.

THE TIME-GEOGRAPHIC APPROACH AND CONCEPTS

This model clearly indicates the originator's interest in devising a way of mapping and assessing a physical

realism in order to understand the problems involved in urban and regional planning and locational policies, so as to promote a qualitative human life (Hägerstrand 1969, 1970, 1973, 1974a, 1974b, 1977, 1978). Recently, many other studies have been published on its approach and concepts and its application in the real world (Carlstein 1973, 1975a, 1975b, 1977, Mårtensson 1979, Lenntorp 1976, 1977, Godkin Emker 1975, Pred 1977, Jones and Eyles 1977:134-40, Carlstein, Perkes and Thrift 1978, Vol. I etc...

Pred's article on Urbanization, Planning and Research (1973), in one of its sub-sections, provides a good coverage of the time-geography model. A more simplified version is also presented by Thrift in a series, "Concepts and Techniques in Modern Geography", entitled "An Introduction to Time-geography (1977). Mainly it deals with the basic information on the approach and concepts of the model.

Therefore, it will suffice here to mention this published material and go on directly to indicate the benefit of the model for this specific case study.

The interesting aspect of this model is that, it assumes that all living and non-living things are in a state of motion (Hägerstrand 1974a:7). As a result, all the actions of an individual or group of individuals are conceived as having both spatial and time dimensions. Space and time are regarded as scarce and budgeted resources. These features of the model effectively describe the circumstances of pastoral nomadism or agro-pastoral nomadism.

Furthermore, one of its conditions, stresses the fact that all tasks are considered as having a duration. Subsequently, it gave a new dimension to what was traditionally considered as "land-use" in a static way in the field of geography. For instance, a particular spatial location is considered as a place which is occupied by different activities in different periods of time. A plot of land which is occupied by a specific domestic organism (crops and fodder crops) will be shown as a vacant slot for another activity after the period of harvest e.g. grazing purpose, which means allowing us to conceive both crops and livestock farming in one context. In extreme pastoral nomadic circumstances, a slot occupied by a social unit (tribe, clan etc.) can be occupied by another in a different period of time (Barth 1959-60).

The model has also further important implications for studies of socio-economic units which have various spatial bases of activities, and which are scattered in the geogra-

phical space. For, it tells us that the movement between points in space consumes time, which implies that the scattered bases of activities should be within a certain feasible distance, to be a useful resource for those who want to utilize it.

In addition, since in this model, to point out the non-events are as important as the occurring events, it is reasonable to say that it highlights the existing opportunities which prompt the emergence of a certain pattern and process of operations, as well as the constraints which are obstacles for non-occurring pattern and processes of operations.

Another essential constraints considered and which have relevance to this study, is that space has a limited packing capacity and has the characteristic of scarcity. In other words, when individuals or groups of individuals endeavour to bundle their resources and carry out the different operations of their activities in a given space, a conflict in planned programmes is inevitable. Subsequently, it will be difficult to organize all resources in order to achieve a viable economic life. Realizing these constraints in every society there are institutions which control and guide so as to avoid the overlapping between planned programmes of individuals or groups of individuals (Hägerstrand 1977:10). In effect, the problem of overlapping of planned programmes in spatial rooms of water and pasture among socio-economic units of pastoral nomadic or agro-pastoral nomadic societies, is one of the most emphasized issues in the various research works. For example, Barth who conceived the pastoral nomadic population and their herds as a traffic flow of trains in a railway network, producing gigantic "traffic jams", indicated that they had solved the problem of overlap or controlling and coordinating migrations, by a variety of political forms in the past and recently by the Iranian army (Barth 1959-60:9-10).

Therefore, the understanding that space has a limited packing capacity and the need of institutions which control and allocate space so as to pursue appropriately a given activity, is the sine qua non prerequisite during the packing or intensification process of a given activity(ies). The controlled area is called by Hägerstrand as a "domain" and commenting on its utility, he noted:

"The purpose of domains....seems to be to protect resources, natural as well as artificial, to hold

down population density and to form containers which protect an efficient arrangement of bundles seen from the inside point of principle" (Hägerstrand 1970:16).

The space-time geographical study also involves a new method of graphic illustration. Since, it attempts to demonstrate the real objective situations of a socio-economic unit, it is conceived as having four dimension space-time. However, to simplify the representation usually two dimensions are utilized, the X and Y axes, each representing the space and time consecutively.

In general, I believe that the approach and the different concepts formulated in the time-geographic model, are analytical tools of high quality that would most certainly give us insight of great depth into constraints and opportunities which affect, in different ways, the on-going changes in marginal regional environments.

Nevertheless, we should be aware that the originator formulated this model having the Swedish terrain in mind, a country which has had a tradition of collecting reliable data since 1749. In contrast, such statistics are very scarce particularly from marginal areas of developing countries. This makes it very difficult to carry out empirical studies. However, this does not mean to say that I reject entirely the use of this approach. For instance, its value as a descriptive analytical tool had been clearly indicated in an earlier published article (Yadeta:1978).

Hence, in this study, I intend to apply it in connection with the demographic linked theory of intensification. This is because the two lines of thought converge over a wide field of common ground.

DEMOGRAPHIC-LINKED THEORY OF INTENSIFICATION

One of the widely read book on the theory of intensification in recent times, is Ester Boserup's study on "The Condition of Agricultural Growth" (1965). The main theme of this book is based on the argument that increasing population density is a spur to agricultural change (or agricultural intensification). Boserup, taking growth of population as an independent variable, she turned the Malthusian line of thought upside down.

Her assesment is also based on other implicit assumptions. She argues that the traditional subsistence farmers

at a given level of development are aware of the existence of multivariant methods of farming, although they refrain from adopting superior techniques of farming, until they are triggered off by growth of population (Boserup 1965: 41). She asserts as well that the subsistence farmers are labour efficient and work consistent with the principle of least effort, unless they are forced to intensify their agricultural activities by an increase of their population. The most important feature of her theory is that she conceives agricultural activities from a dynamic point of view. As a result, intensification for her implies the frequency with which a parcel of land is cultivated and the crop-fallow cycle is taken as a yardstick to measure the level of intensification. This approach is in line with the land-use conception from a time-geographic perspective. Boserup, using this method as a basis, groups land-uses into five main categories 1) Forest-fallow cultivation, one to two crops followed by 25 years of fallow 2) Bush fallow - four to six crops followed by 8-10 years of fallow 3) Short fallow - one to two crops followed by one to two years of fallow 4) Annual cropping - one crop each year with a few months of fallow 5) Multi-cropping - two to three crops each year without any fallow. (see also Grigg, 1982:37-39)

Stressing the advantage of adopting the frequency of cropping as a means of measuring intensification, she remarks,

"One of the advantages of the concept of frequency of cropping as suggested in the present study, is that it makes it possible to bring fallow land, pasture and animal husbandry within the purview of the analysis and thus to appreciate the close relationship between changes in technical and economic factors on one hand and changes in land tenure on the other". (ibid:14)

Hence, she indicates first the link between livestock rearing and crop farming. Secondly, she suggests that while population changes trigger off changes in technical and economic factors, there will be simultaneously demands for appropriate and well defined system of tenure which encourage further investments. In spite of this fact, in most of those works which have attempted to test her theory, particularly in traditional societies, the issues of system of tenure is neglected entirely or discussed in a nebulous fashion (see Basehart 1973, Clark 1966).

So whenever, they point out population density, one cannot avoid wondering how they defined the domain of the people in question. For, this fact has important implications according to Boserup's implicit assumption. At least, they should have tried to examine whether there is tendency to revoke the old system of usufruct rights.

On the contrary, Brown and Podolfsky (1976) presented a relatively qualitative study, indicating a clear relationship between population density, land tenure and agricultural intensity. Their findings discern that population growth is an impetus for expansion, migration and intensifying agricultural practice. But, their conclusion indicates rather than arguing on population density as an independent variable as does Boserup, it suggests that the relationship between population density and agricultural intensity is interactional. Thus, it will be difficult to regard one as the independent and the other as dependent, variables (ibid:228-29).

Gleave and White (1969) who carried out a study on population density and agricultural systems in W. Africa, being unaware of the existence of Boserup's work, arrived at a conclusion which is in accord with her views.

The critics of Boserup's thesis, mostly base their argument on external influences which stimulate changes of technical factors alongside the influence of population densities (Cf. De vries 1967:425-28). Vermer, although he asserts the shift to a better technique of agricultural farming with high population density among the Tiv people of Nigeria, his concluding remarks stress that this change in agricultural technique cannot be related only to population increase, but is as well due to other factors existing in the environment which the people inhabit (Vermer 1970:314).

Brookfield (1972) criticised Boserup's line of thought, indicating that she used an environment-free theory of agricultural evolution. Indeed, it is true that she did not explicitly raise the question of a variable such as environment. On the other hand, in view of various facts discussed in her thesis, it is unfair to say that she was not aware of this constraint as a variable which influences the process of intensification (see Boserup 1965:28-29). It seems in my view, that technology as a freely moving variable is made to reflect the pattern of land-uses which in turn are considered as implicit explanatory factors of environment (ibid:26). Besides, recently in the introductory section of her book entitled "Population

and Technology" she commented on the fact that in her earlier book she used a selective approach or partial model, neglecting other factors purposely in order to illuminate the relationship of the variables considered (Boserup 1981).

Nevertheless, one can say in accord with Brookfield, that the muddling of the environment variable in association with technology has weakened her theory and prevented her from realizing that her responsive process of intensification may differ in feature, in different bio-physical environments. Subsequently, one can conclude that her theory is formulated having in mind a fertile agricultural "milieu".

Brookfield pointed out the need to incorporate the environmental influence into the relationship, because different environments require special treatment. Offering a new option, he conceived a continuum of agricultural feasibility (a series of bio-physical environments in a given area) which vary from one offering minimum constraints (e.g. rich soil of volcanic origin requiring minimum effort for cultivation) to the one endowed with severe constraints (e.g. marginal land requiring a major effort for cultivation). He argued that the fertile land of volcanic origin can maintain a high density of population by simple means. In contrast, the marginal land can support a relatively low population. Then, a slight increase in density would establish a population pressure on the same land. Consequently, agricultural intensification or demands for superior farming techniques would be indispensable even at low population density (1972:42). What he implied, is that the absolute population density cannot reveal where the need for intensity of agriculture is highly in demand, and the rate at which populations shift in the hierarchy to more intensive systems of agriculture, is also influenced by the conditions of bio-physical environment (see further discussion on this aspect on page 156).

Brookfield seems to be influenced by Geertz's study (1963), on "Agricultural Involution", a comparative study on conditions of agricultural changes and population growth in two extreme ecological niches of Indonesia, that is, a swidden eco-system and a wet rice eco-system (Sawah) where he showed a different capacity for population and response to population pressure between the two eco-systems. In any case, Brookfield suggested further in his essay of 1972 that there are many factors which play

roles in the relationship between population densities and agricultural intensities..

The correlation analysis on the relationship between population pressure and agricultural intensity by Turner II et al (1977), reveals a strong positive correlation when environment condition is made to be constant, supporting Boserup's thesis. But the same authors indicated that agricultural intensity is better explained when other factors, such as environment, are added to the relationship, supporting also Brookfield argument on the influence of environmental variables (Cf. Turner II et al 1977:395). In their final remarks, they made clear that the influences of market were not considered in the analysis. Their awareness of various alternatives both agricultural and non-agricultural which subsistence farmers under population pressure have access to, underlined the significance of Grigg's approach.

Grigg neither fully supports Boserup's line of argument nor dismisses it entirely. He goes as far as to find evidence which justifies her argument on the evolution of agricultural intensity vis à vis population density within European, Asian, and African contexts (Cf. Grigg 1976:147-49, 1982:41-42) and evidence which is not in accord with her line of thought (1982:46). Along the line of exploration, he also seems to accept the different constraints suggested by Brookfield. However, his approach differs in many ways. Grigg likewise above all mentioned authority on the theory of intensification, assumes that population pressure is the principle spur for changes in agricultural conditions, but he stresses at the same time that there are many other alternative explanations which prevail simultaneously during the periods of population growth (Cf. *ibid*:43). Thereby he indicated that it is not the only cause. Subsequently, he presented the various alternatives; both agricultural and non-agricultural responses adopted by farmers who are under population pressure. Realizing the difficulty of measuring population pressure (Cf. Grigg 1980:14-19), he relied on what he referred to as symptoms of population pressure, rather than trying to estimate population pressure quantitatively.

In a sense, when one take into account the recent publications of Boserup (1970, 1975, 1981) who seems to raise external factors, particularly non-agricultural technologies, out-migration in addition to population density, as impetus to intensification of agricultural activities, the approach of Grigg is the best available analytical

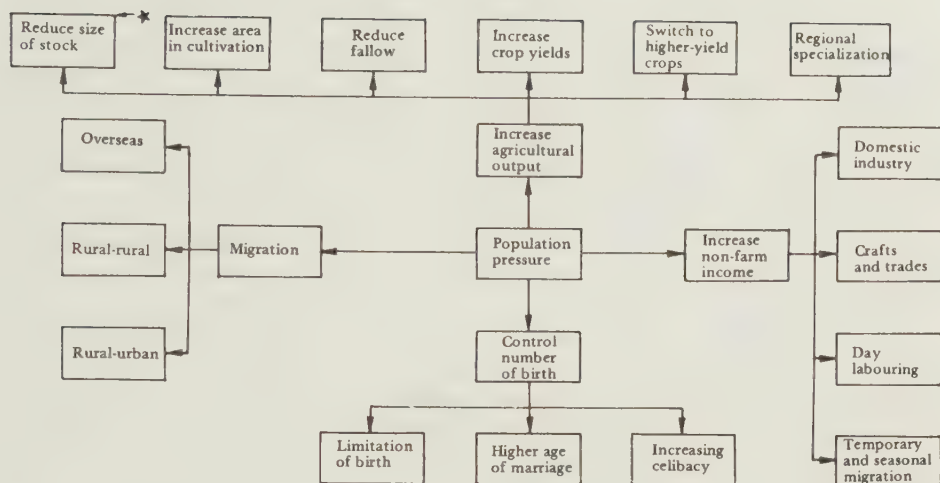


Fig 1.2. Production and demographic responses to population pressure (after Grigg, D.B. 1980:46). * This is added, since agro-livestock economy is being assessed.

framework. It bridges the various ideas on the process of intensification which is practical, particularly in depicting the actual circumstances of the process of intensification in developing countries.

THE APPLIED FRAMEWORK

As mentioned earlier, the approach of time-geographic study is not in contradiction to population linked theory of intensification. On the contrary both are dynamic population oriented approaches which focus on individuals and group of individuals who endeavour to fulfil their needs and wants in an environment structure in which a catalogue of resources and choice of activities (livestock, crops, tools, other artifacts, job opportunities, services, information, Social contacts, leisure-time possibilities etc...) prevail, unequally distributed in the geographical-space and time dimension.

But an apparent distinction between the two is in the formulation of goal. The population linked theory of intensification aims to reveal the lineal relationship between

rising population pressure and agricultural intensity. On the other hand, the time-geographic model focuses in general on understanding how a society is organized and should be organized, so as to raise the quality of life of people. This is the fact to be considered irrespective of the actual population pressure or technical socio-ecological system. Hence, population pressure may be a main constraint or may not be in this context. The aim is mainly to depict all sorts of constraints and opportunities existing in an environmental structure at micro or macro level.

Nevertheless, the new options offered by Griggs as various alternative responses to rising population pressure, are actually constraints and opportunities prevailing in a given agrarian society. Therefore, I believe that it is possible to bridge the two approach in the following way.

In the time-geography model, most of the constraints are believed to fall into three groups: 1) capability constraints which limit the activities of an individual through both his own biological make-up and the tools he can command. For example, the need to sleep limits one's movement in space and time or one's daily productive activities 2) Coupling constraints guide when, where and how individuals, tools and other resources boundle together so as to undertake both productive and non-productive activities in the limited daily space 3) Authority or domain constraints is a time-space room, in which all resources and events are subjected to the control of individual, group of individuals or an institution (Cf. Hägerstrand 1970:12-16, Pred 1973:39-43).

Actually, the three kinds of constraints stressed above, are discussed explicitly or implicitly in population-linked theory of intensification. For example, capability and

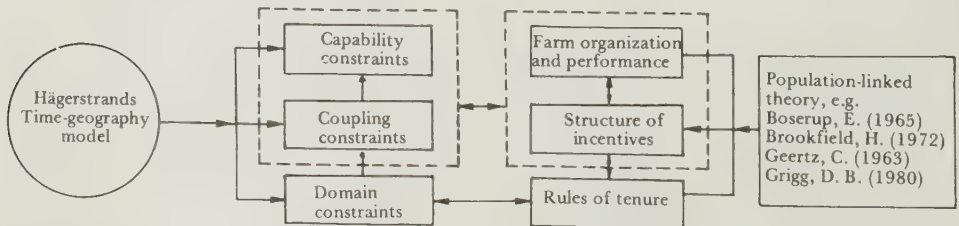


Fig. 2.2. Theoretical and conceptual framework.

coupling constraints are raised somehow in relation to internal farm organization and performance of activities and lastly in association with influences of the existing structure of incentives. The rules of land tenure explains the authority or domain constraints.

Therefore, as indicated in figure 2.2, the results from the time-geographic analysis explained in terms of capability, coupling and domains constraints, can be used for further analysis in association with internal farm organization and performance, land tenure and the existing structure of incentives following the approach of the theory of intensification as it is suggested in the above diagram.

Perhaps, human geographers who have a great interest in the uses of well defined concepts such as capability, coupling etc. may criticize my approach of shifting to more broad concepts such as internal farm organization and performance, structure of incentives etc. I am aware of this fact, but in the actual circumstances of the marginal regional-space, a construction of such a bridge between the two lines of thought in order to utilize each as complement to the other, has a cardinal importance. Firstly, it gives us opportunities of access to various analytical tools that can be used according to circumstances offered within the conceived framework. Secondly, it provides options of research approaches for researchers who have an interest in undertaking a similar study in the near future. For example, when the circumstances of accessibility to relevant statistics permit or if one carries out a well financed project over two or three years, one would have the opportunity to test the time-geographic model, but at the same time without losing the information presented in this study.

Therefore, in the present study, when I examine the process of intensification and the different problems which the people in question are facing today in the areas surveyed, the core of the analysis will be the constraints which concern a) internal farm organization and performance b) rules of land tenure c) structure of incentives.

Nevertheless, before extending the analysis on the process of intensification and its subsequent problems, a clear concept on pastoral nomadism, semi-nomadism Transhumance, would become a prerequisite. Perhaps, these discussions on the ambiguous terminology may also be a fundamental basis for broadening our knowledge on the intensification process itself.

3 ON THE DEFINITION OF PASTORAL NOMADISM, SEMI-NOMADISM AND TRANSHUMANCE

THE CONCEPT "NOMADISM" AND "PASTORALISM"

As stated earlier, the weakness of "pastoral nomadism" as an operational definition has resulted not only in the use of it for different concepts, but also in the development of new terminology which is closely associated to pastoral nomadism e.g... "semi-nomadism", "semi-sedentarism", "restricted-nomadism" and "transhumance". This new terminology instead of resolving the confusion and furthering the understanding of pastoral nomadism, has become the main causal factor for even further confusion. Yet, most of the contemporary social anthropologists, geographers... are still engaged in classification of nomadic societies under the headings of this different terminology, even before defining what each term means through properties attributed solely to the term referred to, or through quantifying the value of the attributed properties. In most cases, social anthropologists place more emphasis on the social organization e.g. tribal structure, class hierarchy etc...(Bacon 1954, Patai 1951), while within geographical studies, although consideration is given to spatial relations in a static way, the methods of analysis are more or less similar to those used in social anthropology (Capot-Rey 1961, 1962, 1963, Clarke J.I 1959).

It would seem from some recent studies, that there is a trend to focus more on the activities of pastoral nomads: For instance, Barth's studies on South West Asia 1959-60, 1964, Sweet 1965, Paine 1972, Rada and Neville Dyson-Hudson 1969, Rada Dyson-Hudson 1972 etc...). Johnson has also attempted to give a more meaningful synthetic picture of pastoral nomadism through a critical survey of all available material on the subject (Johnson 1969). Consequently, it is possible to assert that his definition of pastoral nomadism is more progressive relatively speaking. He conceives pastoral nomadism as an activity which is maintained by oscillating between agro-economy and

livestock-economy, depending on the socio-ecological environmental conditions (ibid:3).

Nevertheless, a great deal of attention is given in his study to classification of observable behaviour. But, the processes of the annual activities which clarify the space-time actions are left completely unexplored or not described as sequential functions in a time dimension.

Hence, all these various studies, though they shed light on the spatial behaviour of pastoral nomads, do not give a clear picture or complete knowledge of the different resources which establish the activities system, that is, pastoral nomadism. As a result, whenever they wish to distinguish the different stages of pastoral nomadism, they are forced to rely on the traditional classification such as, "semi-nomadism", "semi-sedentarism", "transhumance" etc... From such studies, limited knowledge is gained which can be used as base material for practical planning. It is these particular problems connected to these concepts that will be discussed in the following section.

According to traditional usage, "Nomadism" has a connotation which means living on pasture, derived from the Greek work "Nomados" (Patai 1951:401, Salzman 1967:115). However, there is another term which is often used by different scholars, that is, "Pastoralism" which has affinity to the word pasture (e.g Stenning 1958, Jacobs 1965). This implies that "Nomadism" and "Pastoralism" are used interchangeably to define the same type of activities. However, if we examine the list of definitions given in the multitudinous literature, it is apparent that "Nomadism" has another meaning as well. It denotes the spatial movement of the actors in question. In fact, it is possible to say that it is frequently used to refer to the loosely programmed human spatial mobility behaviour. For example, the Oxford English Dictionary defines "Nomadism" as follows:

"The practice, fact, or state of living a wandering life...The civilized English nomad is usually a person of independent means." (O.E.D:Murray, Bradley & others)

Bacon also considered the sleyb or Sulubba desert hunters who live in tents in the Arabic peninsula (1954:45) as nomads. Briggs is another scholar who divided nomadism into two groups: Firstly, non-pastoral nomads, who are hunters and gatherers with or without permanent settlement.

Secondly, pastoral nomadic groups which include the tribes of Arabs, Moors, Tuaregs and Tedla of Northern Africa and Sahara regions (Briggs 1960:106-117). Kearns (1978) in his article: 'Irish tinkers are unwelcome', asserts that 11 000 nomadic tinkers are scattered in Ireland along the fringes of urban areas.

In addition, in studies of phenomena of cultural evolution, it is argued that nomadism as a human activity appeared in the palaeolithic age, whereas pastoralism emerged in the neolithic period, being interrelated with the domestication of animals and plants (Krader 1959, Bacon op. cit.). Therefore, it is pertinent to underline the dual meaning attached to the term "nomadism". In other words, there are many types of nomadism having one common characteristic, that is, spatial mobility in a time dimension. Pastoralism is one of the sets of nomadism.

Salzman also notes that pastoralism is one of the sets of nomadic activities. Furthermore, he attempts to resolve the misunderstanding which exists concerning pastoralism and nomadism. He states:

"Nomadism is a kind of movement; for the moment let us say that it is movement as part of the cycle of food extraction. Pastoralism is management of and food extraction from a particular type of resource, domesticated or semi-domesticated animals...Pastoralism can be associated with the entire range of movement, from none at all to continuous movement."

(Salzman 1972:67)

In other words, pastoralism can be found with or without association to nomadism. It implies that there are two ways of pursuing pastoralism. First, pastoralism as a livestock economy which can be performed repeatedly every year for indefinite time periods in a single station (i.e. a defined farm-land, ranch etc..).Second, pastoralism which can be performed by transferring the human population (the personnel who carry out the activities), the domestic or semi-domestic animal population and the required transportable equipment through series of stations. At each station, operations are carried out according to its capacity to supply bio-organisms (sources of energy) for a limited period of time. The vital question is, if it is appropriate to conceive these two different processes of livestock activities as one under the umbrella of pastoralism or nomadism.

We may better understand these two different circumstances if we pay further attention to the activities system, taking into account the spatial and temporal dimensions. The former type of pastoralism indicates intensive use of a unit of land (over a period of time) and a better allocation system of human-time for productive purposes. It also demonstrates the application of higher techniques for storage and transportation systems. In short, it could be said that all resources are organized in a bundle in time and space, establishing harmony which may result in a more economically profitable activities system. Whereas, in the case of the latter type of pastoralism, a noticeable factor is the high investment of human time on spatial mobility from station to station. This results in difficulty in organizing the human resources in relation to the different circumstances of stations i.e. coupling constraints, assessment of space-time capacity etc... in the annual course. Whatever the case, it is possible at least to deduce that the time available for grazing and other livestock activities is less in comparison with the former system. In addition, the bases of activities and interactions over the annual cycle are loosely packed. It is for this reason that the activities system stationed in a single space-time, is referred to in this study as "Pastoralism" of mixed farming or ranching, while the other, which is operated in series of stations over time in continuum or in a regular circuit in the annual course, is called "Pastoral Nomadism" denoting both the spatial movement and dependence on natural bio-organisms i.e. pasture, etc...

This method of distinction between "pastoralism" of mixed farming or ranching and "pastoral nomadism" is of great importance. Not only does it depict the question of involvement of the high cost of time on spatial mobility on the one hand, while on the other hand, polarization of activities by packing resources coherently into one single station, but, more important, it guides us to conceive pastoral nomadism within the context of modern livestock activities. It is also acceptable to say, since modern livestock activities undoubtedly involve cultivation and better transportation and storage techniques, that pastoral nomadism can be conceived within the same "port-manteau" of settled agricultural activities (figure 1.3a).

Moreover, the same approach fits the school of thought which argues that pastoral nomadism is a specialized offshoot of agriculture that developed in the transitional

areas. One of the supporters of this thought is Johnson who writes:

"Here some groups, in order to exploit the nearby arid areas that were unusable from an agricultural point of view, gradually increased the numbers of their domesticated animals until concern for the flock began to take precedence over farming activities. Once this point was reached, a series of years in which rainfall totals were below normal would encourage abandonment of agricultural pursuits and concentration upon the flocks as the major subsistence source (Johnson op cit. : 2-4").

As it is outside the scope of this paper to open a dialogue on the historical development of pastoral nomadism, it will suffice here to simply state that the above approach is useful for exploring the different ideas which we encounter in the diverse literature available on the subject. On the other hand, it is worth noting that the contemporary pastoral nomads, in the actual sense, oscillate frequently between agro-economy and pastoral nomadism according to conducive circumstances for both types of activities. (Barth 1961, 1962, Capot-Rey 1961, Bataillon 1963)

Figure 1.3a indicates how pastoral nomadism is conceived here in contrast to non-traditional livestock economy. B is the central residential place of a unit of a pastoral nomadic group. From this main station, they move their herds and operate their herding activities in a chain of stations or sets of pasture-space-time, and return to their departure place to end the annual cycle. It should also be noted that each station has a different capacity to provide bio-energy to the herds in question. As a result, their duration in each station varies. Furthermore, it shows that the herding behaviour is variable. In certain stations for instance, the same herds use a small area intensively over a period of time, while in other cases, they graze in a large extended area.

In farm A, another unit practices pastoralism in a single station instead of using a sequenced chain of stations. Actually, there are various types of such livestock farms, varying from technologically advanced to simple livestock farms. The latter are common among the sedentary Fulani in Zaria in the Northern part of Nigeria (van Raay 1975) or among the Kipsigis in Kenya (Manners

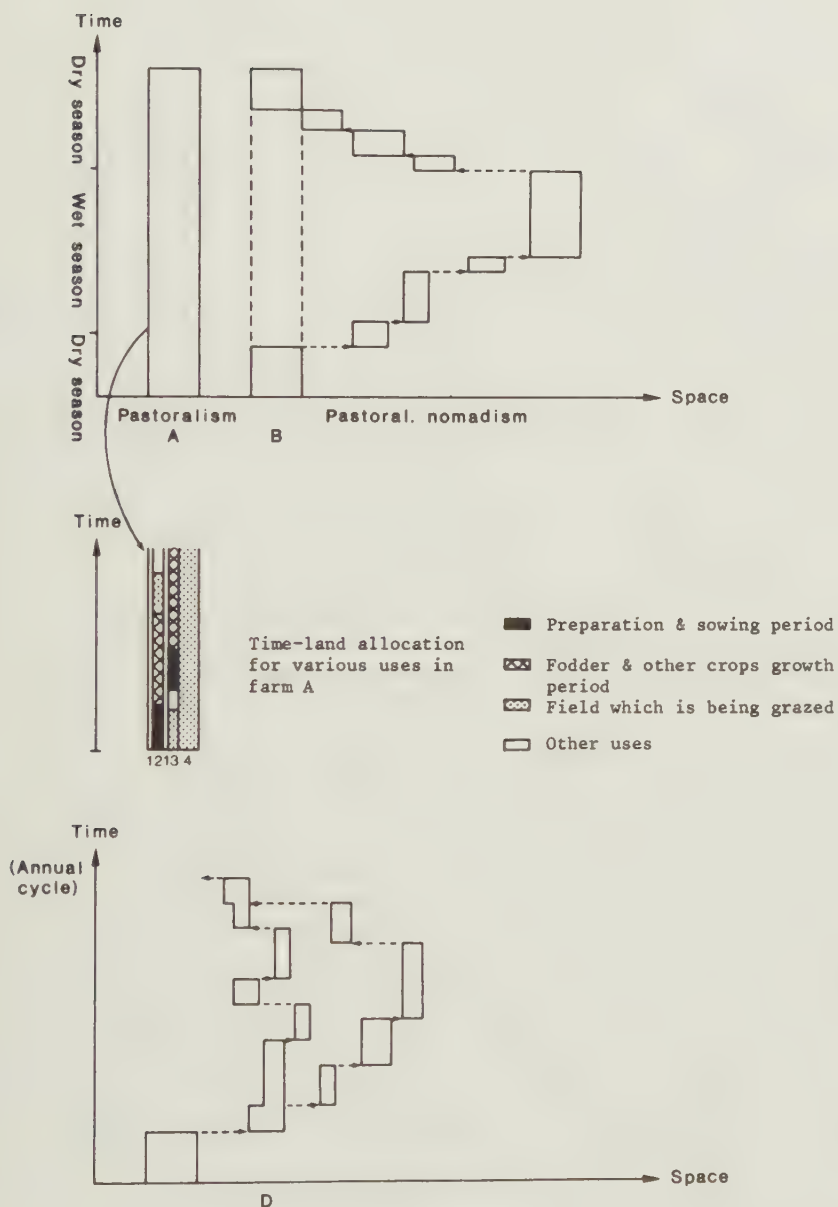


Fig. 1.3a. and 1.3b. These indicate the spatial organizations in space and time under pastoral nomadism and pastoralism (mixed farming).

1962). Let us assume that the farm A represents the latter case.

The time-land allocations of farm A for various uses are demonstrated separately in figure 3a. Hence, it is clear that the domestic animals are supplied with fodder crops which are undoubtedly stored so that they can be used throughout the year. In addition, it indicates that the domestic animals are taken on to the cultivated land after the harvest so that they can graze on the residue of the crops (see figure 1.3a, cultivated lands 2 & 3).

The pastoral nomadic unit which does not supply their herds with fodder crops at B, while having the same size of land in the same ecological niche, can only use it as grazing ground for a short time in the annual cycle. Thus, they have to move with their herds to carry out their activities in the scattered sets of pasture-space-time stations for the remaining part of the year to guarantee the survival of their herds and themselves. Naturally, such spatial behaviour has a negative effect on efficient uses of human-time as well as on land resource. All in all, approaching the study of pastoral nomadism within the context of these two sorts of livestock economy will yield considerable insight into the intricacies of rural life of both pastoral nomads and sedentarist herdsmen. Simultaneously, we will be able to depict the variables which play the determining roles in the packing processes of pastoral nomads' bases of activities and interactions.

Figure 1.3b points out a minor difference with case B (figure 1.3a). In this case, the pastoral nomadic group forms two sub-units at the station D. The act indicates relatively better land-use techniques as well as better techniques of allocation of herds. For instance, herds which remain within proximity to their central place of settlement could be the sub-unit which has better access to the best pasture-lands and water sources. However, the two sub-units form one unit again towards the end of the migration period. Stenning's (1957) description of the Fulani migratory pastoral nomads is excellent illustration of this case.

SEMI-NOMADISM AND SEMI-SEDENTARISM

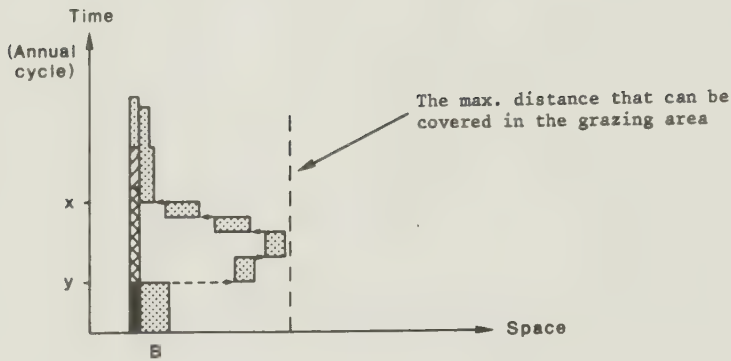
In the foregoing section, it has been asserted that pastoral nomadism is a set of operations which may be projected in a continuum over time or in a circuitous pattern over

the course of year. Nowadays, in practically all cases, pastoral nomads have adopted the spatial behaviour of moving to a specific niche during part of the annual cycle and returning to their departure point or main station again (e.g. their main homestead or the central place of their home well). In contrast, in other modern livestock activities systems, all the sets of operations are performed in a single station. Undoubtedly, this implies that the different resources and human activities are highly packed in this particular station in a time dimension.

Thus, it is reasonable to deduce that the so-called Semi-nomadism or semi-sedentarism are between the two extreme cases, being relatively different in their packing processes of their resources while pursuing their livestock activities in time and space. But, this relative question should not mislead us to conclude that the social group in question is in the process of settling down. It merely shows that the circumstances of that moment have allowed or forced the group to modify its traditional ways of living.

Instead of placing great emphasis on the description of the change of ways of living, it would be more beneficial to stress the depiction of constraints and opportunities which generate the change in more comprehensive or measurable ways.

Let us give our attention to the following illustrations. The first graphic representation shows a unit of a pastoral nomadic group which allocates a part of its time to cultivation of crops which may be partially supplied as fodder crops for the domestic animals. As demonstrated in figure 2.3a, the herding activities outside the centre B. are circumscribed by the sowing period (shown in black) and by the harvest season (shown by the oblique lines). In these two particular periods, since a greater supply of human-time is required, the herding activities must be carried out in the vicinity of centre B. with a minimum labour inputs. After harvest, the domestic animals are permitted to enter the fields to graze on the residue of the crops. This is, in fact, a method of herding activity adopted to shorten the period of scarcity of energy resources. In short, it is possible to deduce that the figure 2.3a indicates a pastoral nomadism which has relatively better packed bases of activities and interactions in comparison to the other cases (e.g. figure 1.3b). Some of the Fulani of the Northern Nigeria around Zaria have such spatial behaviour while pursuing their annual



B = The main homestead (station) of pastoral nomadic unit constituted of grazing land & cultivated field

x-y Time = The time available for herding & spatial mobility



X = A cultivated field

A = The main homestead (station) of pastoral nomadic unit constituted of grazing land

- Preparation & sowing period
- ▨ Fodder & other crops growth period
- ▧ Harvest period
- ▤ Field which is being grazed
- Other uses

Fig. 2.3a and 2.3b show the allocation of human-time(or labour) for crop cultivation and its effects on pastoral nomadism.

activities (van Raay 1975) .

In the case of figure 2.3b, the situation is more or less similar to case 2.3a but with the difference that the pastoral nomadic economic unit is not the owner of the field. Instead, the people are engaged by the sedentary farmers during the harvest period. As the result, they have access to the residue of the crops after the harvest. Which implies, in a sense, that the pattern of their herding activities is arranged so that it coincides with the harvest period of farm X. In other words, this new arrangement has developed a limitation on the extent of herding activities. The Arab pastoral nomads of Mauritania are good representatives of the case described (Toupet 1963).

In the past, no endeavours were made to analyse the labour conditions, allocation of pasture-land over the annual cycle. Nor was any useful quantitative analysis made in relation to pastoral nomadic societies. In general, there was a considerable reliance on observable behaviour and artifacts i.e. having a cultivated field. That is why we are still incapable of making clear distinctions between "semi-nomadism" or "semi-sedentarism" and "pastoral nomadism" or between "semi-sedentarism" and "semi-pastoral nomadism". Consequently, in many cases, resort was made to wild guess-work. For instance, Lewis in his study of pastoral nomadic society of the Horn of Africa, seems to have had difficulty in associating the people in question with semi-pastoral nomadism or semi-sedentarism. Yet, he was sure that the pastoral nomadism of the people of Somali was circumscribed by multitudinous constraints. Thus, his awareness of these limitations has compelled him to refer to this specific activities system as "restricted- pastoral nomadism" (Lewis 1961:49). Nevertheless, his case is not very different from the preceding ones. It simply indicates the degree of packing in a vague manner, and his new terminology is the direct result of the ambiguity of the terms, "semi-pastoral nomadism", "semi-sedentarism", so on...

TRANSHUMANCE

The other problem often observable in the study of nomadic societies is in connection with "transhumance". To point out its deficiency as a tool of operation for practical planning purposes, mention needs to be made to some of the many groups who are referred to as practicing trans-

humance. This gives clarification to the problem. For example, the Jie and the Pokot of the East Africa (Gulliver 1955, Widstrand 1973), the Tuareg of the Ahaggar (Briggs op cit, Krader 1966), the transhumance of the Mediterranean regions (Lefebvre 1928, Gardelle 1965), and the Baseri of S.W. Asia (Barth 1959-60, 1962), the Swedish and Finish Lapps (Israel 1956,) etc... are all described as practising "transhumance". However, simple observation of their activities system and their spatial behaviour, that is, their movement pattern from one bio-ecological niche to another, indicates the gaps which exist in their relationship to each other. Therefore, to classify these groups under the common term "transhumance" is indeed erroneous.

"Transhumance" is often defined as seasonal movement from low to high altitudinal region (Patai 1951, Bacon 1954, Widstrand ob cit). This means "transhumance" denotes the general behaviour of spatial mobility. But this is not the case in many studies. It often seems unclear whether transhumance is utilized to denote the spatial movement behaviour or the activities system.

Yet, there is one fact which is underlined by the term "transhumance", that is, the entailment of double trips due to climatic variations or two favourable pastoral ecological niches (the movement from the low to high lands and vice versa). This pattern of movement must have been very important when the majority of pastoral nomadic groups were practicing continuous movement in space and time without returning to the point of departure. But, nowadays, due to internal and external constraints, the acceptance of the idea of the aimless wandering of pastoral nomads is out of date. Hence, the general socio-economic development of marginal regional spaces has established a pastoral nomadism which is completely different from the one which prevailed a hundred years ago. The same development has nullified the only vital factor which was emphasised by the term "transhumance". Thus, the movement towards higher altitudes is not enough to exclude "transhumance" from the term "pastoral nomadism". Bacon argument is worth noting at this stage, she writes:

"Verticality in migration appears to be a matter of topography and climate, and may be found in association with any of the several kinds of nomadism-full, semi-nomadic and sedentary".(1954:54)

Climatic variations in this case are a function of altitudes, which as well mean a change of pasture areas. Therefore, it is more fruitful to emphasize the change of ecological niche, to avoid unnecessary confusion. In fact, both Bohannan (1963:214-215) and Stenning (1957:145) applied transhumance for seasonal movement from one ecological niche to another without referring to change of altitudes. For instance, for Stenning "transhumance" is the Fulani's movement southwards the densely vegetated tropical regions in the dry season and northwards in the wet season.

This discussion is meant to demonstrate that pastoral nomadism has been developing in the historical course of time and as a result, it has become difficult to separate it from the so-called transhumance based on the traditional definition.

In fact, it is accepted in this study that there is a possible difference, both in organization and performance of activities, between the so-called transhumance and pastoral nomadism in certain cases. Obviously, if relative differences prevail, it indicates the existence of new limitations which circumscribe the activities of the given social group. But, what it is underlined here as the central question is whether the reliance on the usage "transhumance" facilitates our work in the process of planning or hampers it.

Brémaud and Pagot attempted to give further insights on the same issue, but their definition is not similar to the traditional definition. They explain the issue relying more on the processes of the activities, that is, pastoral nomadism. They argue that, under transhumance, the repeated movement to the same area over several years gives the herdsmen opportunities to acquaint themselves more with their ecological niche. That means better knowledge or information on their environment. Further on they note that it also leads to the development of higher political organization (Brémaud and Pacot 1962:319). Another authority on this subject, explaining its difference from pastoral nomadism, writes:

"The transhumant herdsmen has... a house to which he returns, the transhumant pastoralist, moreover, is not a member of an independent economy, but is part of a larger whole, the economic complex of the whole countryside (e.g. Spain, Italy, Greece, western USA, south-eastern Australia)".(Kradner 1959:409)

Although these facts are worthwhile considering, all the properties which were attributed to transhumance, can also be attributed to contemporary pastoral nomadism. For instance, contrary to Krader's assertion, in most Northern African countries, in the West; Senegal, Chad, Niger etc... and in the East the republic of Somali, pastoral nomadism is part and parcel of the economy of the whole nation.

Barth also accounts in detail for the transhumance which prevails in South West Asia by depicting the different constraints which the people encounter during the processes of the annual migration. For example, along the route of migration, there are farm lands which are occupied by domestic organisms during specific periods of the year. In other words, the paths leading to the summer or winter ecological niches of the pastoral nomadic communities are closed during this particular period of time and are only opened for them before the sowing season and after the harvest. This in return creates traffic congestion on the open paths of migration during this period. To avoid this problem, a kind of schedule has been devised for each social group which gives right to occupation of certain space at particular times (Barth 1959:5). Such new limitations have implications of great importance for the organization and performance of activities.

Transhumance of the Mediterranean regions

Unlike the highly restricted transhumance which prevails in Africa and Asia, the transhumance of the Mediterranean regions is in a state of rapid evolution and it has also been well integrated with other economic activities prevailing within the same regions (Gardelle 1965). This is the direct result of the introduction of technologically advanced transportation systems. Consequently, the transhumance of these regions can be analysed in connection with the railway and road patterns which connect the higher Alps' regions. Very few practice the traditional behaviour of spatial mobility, that is, the herdsmen no longer accompany their herds on foot. Nowadays trains and trucks fitted up with three decks are used as means of transporting the herds from the "Midi", the lower Mediterranean to the Northern higher Alps' regions within a period of 24 hours (ibid:455).

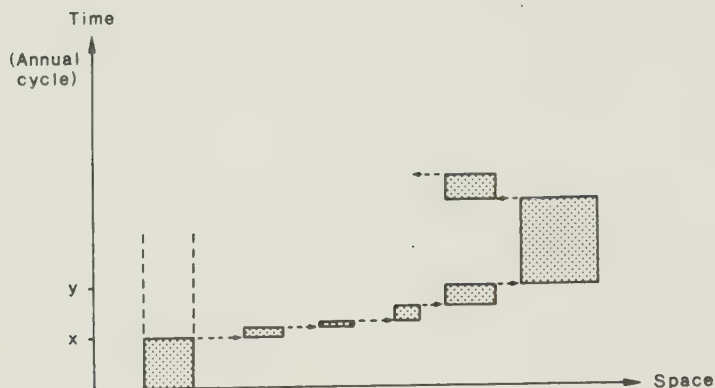
The same author further describes how the pasture lands are well defined, functional domains of individuals or group of individual herdsmen and he notes the existence of three types of pasture lands: a) pasture lands owned by the owner of the herds, b) pasture lands owned by other individuals who are not herdsmen, but who rent their pasture lands to the herdsmen of the "Midi", c) pasture lands owned by a commune. In short, the transhumance of the Mediterranean regions is performed in entrepreneurship. As a result, big capitalists who own herds (generally sheep) which vary from 3 000 to 6000 are common. Yet, the same individuals or groups of individuals are referred to as practising transhumance in the same way as in the early twentieth century.

Gardelle's study focuses mainly on how the practice of transhumance has increased and expanded spatially in the historical course of time, especially after the recent introduction of new transportation systems. However, the author does not elucidate how the change of temporal dimension in the process of spatial movement affects the activities systems of the people concerned. (See fig 3.3a&3.3b).

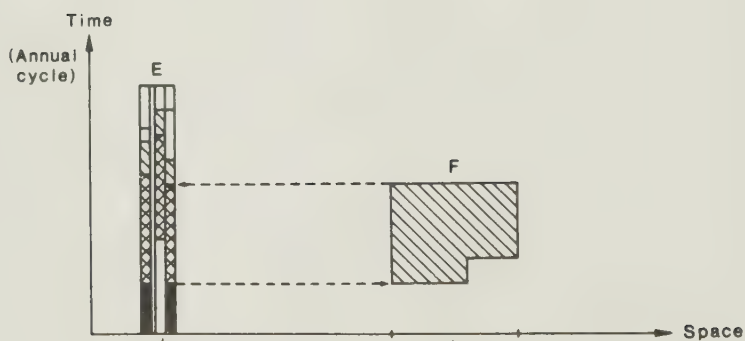
As stated earlier, transhumance cannot be distinguished from the cases which were depicted earlier unless we base our argument on changes of topography, which in fact are not enough to give it a distinct feature. Figure 3.3a is a good illustration of the transhumance which prevails in the Ahaggar (by Tuaregs). To reach the last important time-pasture land, they need to invest $y-x$ time out of the annual cycle. It indicates also how their time-pasture lands are distributed in a scattered pattern in time dimension.

On the contrary, the graphic illustration 3.3b, which represents the transhumance of the Mediterranean regions, indicates that distance is broken down due to the introduction of modern transportation systems. Which implies that domestic animals of higher quality and quantity flow between the two stations. As a result, the human-time traditionally invested along the migration route (e.g. $y-x$ fig. 3.3a) is now used for livestock rearing activities and leisure purposes. Besides, it shows how their time-pasture land is consolidated in one area, indicating higher packing processes.

Moreover, the involvement of the cost of transportation by trains or trucks prerequisites the existence of well-defined domains of pasture-space-time stations at the other end of the journey. Otherwise, rational economic



Transhumance in the Ahaggar (Tuaregs)



The farm in the 'medi',
subdivided for various
uses over time

The pasture-time land
in the higher alps
region

- Preparation & sowing period
- ▨ Fodder & other crops growth period
- ▧ Harvest period
- ▩ Field which is being grazed
- Other uses

Fig. 3.3a and 3.3b represent transhumance in the Ahaggar of North Africa (by Tuaregs) and in the Mediterranean region.

decisions on the circumstances are impossible to make based on partial information of the bio-physical environment and other resource. It implies then that all the necessary information such as on the carrying capacity over time of the selected pasture lands, access to cabins etc... is obtained in advance. Such information could be gathered by visiting the pasture areas in advance or through contacting other persons who had come directly from the same areas. Gould expressing his view about the Ghanian traditional cattlemen and the impact of a new system of transportation, writes:

".. an improved road link, a visible sign on the landscape of a technological improvement, changes man's perception and evaluation of the same choices available to him before, and as the result changes the patterns of flows.." (Gould 1969:246)

Similarly, in the Mediterranean regions, the strategies and techniques adopted in carrying out the different operations of the annual project have changed completely from the one adopted traditionally. This is mainly because of innovation of rules of tenure, new technologies of transportation and existence of sufficient incentives in the given structure of environment. In a sense, the so-called transhumance of the Mediterranean regions should not be conceived outside the scope of modern livestock activities.

Thus, using the single determining factor of altitudinal change, geographers, social anthropologist, ecologists have coined the term "transhumance" to describe all these diverse livestock rearing activities systems. It is evident that the widely utilized definition does not explain the diversified processes of the activities systems. That is why "transhumance" as an operational tool has neither the power to reveal the features which clearly distinguish it from pastoral nomadism, nor to clarify the divergence which exists among the social groups which are referred as practising "transhumance". We may, therefore, characterize the term as incompatible with the objective condition of livestock rearing activities.

Conclusion

Summing up, this chapter does not find evidence of

any special advantages in using these concepts "semi-nomadism", "semi-sedentarism" and "transhumance". In fact, It is reasonable to say that we do not have a basic criteria for distinguishing an agriculturalist who also keeps livestock from a herdsman who also cultivates. We just attach the terms "mixed farmers" or "semi-pastoral nomads" before obtaining complete knowledge of their circumstances.

The common classification based on observable behaviour, such as possession of dwelling places, tools, long and short distance migrations, altitudinal change, types of herds, possession of farm-land etc... cannot provide us with the explanation we are looking for. Consequently, it is apparent that such narrow and vague definitions expressing the stages of development of pastoral nomadism are not useful tools for operational purposes. Instead, until we have at hand concrete materials which help us to disentangle the interwoven situations, it seems that it is fruitful at this stage to define as broadly as possible all these fragmented thoughts by one or two frames of reference in order of increasing degree of intensity. Such well defined terms will give us enough room to explore and re-assess the same field at greater depth. Let us put all these facts into a synthesis.

a) "Nomadism" involves not only activities which depend on pasture, domestic or semi-domesticated animals and spatial mobility, but as well, all loosely programmed activities entailing spatial mobility. This includes hunters, collectors of wild fruits, pastoralists, gypsies such as the Irish tinkers, mobile workers etc...

b) "Pastoralism" prerrequires domestic or semi-domestic animals and natural or domesticated bio-organisms e.g fodder crops, crop residue etc... as well as the personnel to harmoniously organize these different resources.

c) The same activities system (pastoralism) can be pursued in a polarized single station e.g. a farm or ranch (here, the spatial mobility within this defined space is considered insignificant or not registered) or in stations arranged in a sequence which entails a high cost of human-time on the spatial mobility. Consequently, since the latter is determined by mobility of herds and human population in space over time, it will be referred as "pastoral nomadism".

d) Agro-pastoral nomadism will simply denote the condition of prevalence of a relatively restricted spatial mobility due to involvement of crop cultivation. Nevertheless it

indicates as well the lack of organic integration between livestock rearing and crop farming. In other words, the domestic animals depend on fallow land, permanent grazing land, crop residue, but not on cultivated fodder crops.

e) "Pastoralism" in a single station indicates a high packing process of the activities system. Implying organic integration between livestock rearing and crop farming. Hence, at this level cultivation of fodder plays a role at least as important as other natural sources of biotic food. Such circumstances of rearing livestock and crops farming will be referred to as a mixed farming or ranching.

At this juncture, it is worthwhile to note that the broad definitions given above are just the turning point of the packing or intensification process. For instance, it should be understood that there are various degrees of intensification between agro-pastoralism and mixed farming. At this stage, the classification of the system of land-use in order of increasing intensity as suggested by Boserup (1965), can be a useful analytical tool to identify the degree of intensification.

4 THE PACKING OR INTENSIFICATION PROCESS

INTRODUCTION

In the foregoing chapter, while discussing the vague terminology such as semi-nomadism, transhumance.. it was pointed out how the intensification levels differ in degree. In particular, how the various constraints which exist in many highly mobile pastoral nomadic environments have been neutralized both by internal and external factors, and how they were able to establish a highly packed technical socio-ecological system by those who are practising the so-called transhumance in the southern part of France. Subsequently, it was suggested that the understanding of the different levels of intensification existing among such societies in developing countries need first, a broad concept such as agro-pastoral nomadism. This simply denotes the involvement of livestock rearing, cultivation of crops and mobility of human population, but does not involve integration of livestock and crop farming through fodder crop cultivation. Second pastoral nomadism implies strictly the traditional ways of livestock rearing in an abundant land resource. Once having the basic ground for further analysis, in this section there will be an attempt to broaden our general knowledge of packing or intensification processes within the context of the actual general progress of development of marginal areas.

RESOURCES ORGANIZATION, SPATIAL MOBILITY AND EXTERNAL CONSTRAINTS

As noted earlier, pastoral nomadism is a human activities system which demands at the rudimentary level, access to livestock and spatial rooms of biotic food-webs which will be sources of energy for livestock. The biotic foods could be natural pasture, leaves of trees, or crop residue. Nevertheless, the presence of bio-organisms by itself cannot be a source of energy to livestock. It must be accompanied by sources of water. Hence, the availability of biotic food-web and water sources in space and time should be regarded as inseparable.

It was also asserted that pastoral nomadism or agro-pastoral nomadism is an activities system of sequenced operations which occur in different bio-physical space-time. Each of these spatial rooms has a limited capacity to supply biotic food energy to a number of livestock.

An individual pastoral nomadic actor is aware of his regional circumstances, that is, the scattered distribution of his resources and their variabilities over time. Consequently, he knows that he must invest his time for movement from one potential pasture location to another. Leo Silberman stressing one of the World Bank reports, noted:

"By natural selection, the nomad has proved a skilled ecologist maintaining the most delicate adjustments between the capacity of his animals to go without food and water and timing and route of their movement from one grazing ground or water source to the next. There are wide variations in ecological conditions to which they have to respond and correspondingly wide variations in the animals that are kept and the area of movement." (Silberman 1959:559)

The same argument is supported by Barth (1961, 1962), Pehrson (1966), and Bonté et al (1973).

As a result, the efficacy of their activities can be evaluated only by observing whether or not their spatial movement coincided to the dynamic, unevenly distributed natural water-pasture resources in the annual course. But, the scattered natural distribution and its variabilities in time, demands the presence of the herdsmen and their herds at many locations simultaneously. However, the indivisibility of both individual herdsman and animal does not permit the realization of the opportunities provided by nature (Hägerstrand 1974).

Thus, in the absence of high technology of transportation and storing systems the pastoral nomads have another alternative left, that is to resort to covering a long distance journey to exhaust effectively all the available multivariant ecological niches during the annual cycle. Yet, even the acceptance of the long distance journey may not always be a solution to the problems facing a pastoral nomadic socio-economic unit. This is because visiting the chain of water-pasture stations requires traversing space which consumes time. A pastoral nomad, then, must balance the time allocated for grazing and that which is solely for movement purposes. If the movement

is tedious, it affects the productivity of the unit of herd which in turn may have a direct implication on the dependent household. Such problems are noted by van Ray (1975:110-117) on the Fulani near Zaria in North Nigeria. According to him their behaviour in connection with the organization of grazing days suggest a desire to minimize movement if the scarcity of food for livestock does not dictate differently.

In certain circumstances, collective herding is a necessity. For, a formation of a pool of manpower consisting of many households, permits an individual socio-economic unit (a single or extended household) to disperse its sub-herd to different water-pasture stations at the same time. Especially if the herd constitutes different types of livestock or if they are suffering from an acute scarcity of pasture and water or are affected by spread of diseases; this strategy of dispersing herds was, at least in the past, the most desirable action.

Therefore, even though it seems reasonable to say that the nature of distribution of stations of potential sources of energy is a potent determinant factor, which governs the manpower (or human-time) needed, man through resources organizations can minimize the strength of this constraint. For example, if the herd unit is made to constitute different type of livestock, it is possible to minimize or maximize spatial mobility which affects accordingly the needs of manpower. For different types of herds have different biotic food preferences and water requirements. The following quotations can elucidate this situation.

"Cattle and sheep drink often so, must not be too far from a well. Camels drink less often so, go further afield." (Swift 1973:75)

"The management of the flocks is in some ways more exacting than camel herding. In the dry seasons, the sheep and goats have to remain within the radius of a few miles from water...The problem is therefore to find adequate pasturage and at the same time to keep within striking distance to water." (Lewis 1961:59)

"(Sheep) they need to drink every second day during the hot season and hence they must have a choice of pasture lands within a radius of under 20 miles of water point... (Camels) they can go for a long time

without drink, even in the hot season. This makes it possible to disperse them over a wider area and make maximum use of the desert vegetation.."(Capot-Rey 1962:303)

In addition, whenever the family's herd is reduced, they supplement their losses by cultivating land in order to balance the needs and wants of the family from both crops and livestock (Cf. Johnson 1975:79).

Such pattern of movement and grazing activities must have been most probable in the old good days, when the nomads' movement were not restricted e.g. a circuitous movement of two to three years used to be accomplished by Requibek ethnical group in 1934-44 in North East Sahara (Cf. Bonté et al 1973:35-36). But in present days, the land which was previously controlled by pastoral nomads is no longer officially under their jurisdiction. This is a common event in almost all marginal areas of developing countries. From the beginning of the colonial period, the pastoral nomads' access to land resource and their free activities have been eroded both in time and space. New settler encroached on their land, cultivation expanded, national governments encouraged new development projects such as cotton, sugar plantations through irrigation systems e.g. Sudan, Ethiopia etc.. Along these developments new infrastructure constructions such as roads, market organizations, abbatoirs and other social amenities, job opportunities were made available in incoordinated ways. These new conditions led also to rapid population growth which is indicated earlier (see page 5). Consequently, tensions and conflicts accentuated between social units such as tribe(s). Today, where the impact of the changes is stronger due to internal and external factors, it is even rare to encounter a sub-tribe in one locality.

At the same time, some of the national governments emerged as agents of innovation and furthered the construction of infrastructures such as drilling water-wells, introduction of new rules of tenure, veterinary services, extension agents, livestock market and co-operative organizations etc. with an ultimate goal to raise the standard of living of these people, and to integrate them into the national socio-economic system, but with little success.

As a whole, the marginal regional space of developing countries has been gradually changing ecologically, economically and politically in an unprecedented way over recent

years. Therefore, it is within such circumstances that the analysis of packing or intensification processes of the activities of the people in question should be considered.

HUSBANDRY AND HERDING AS SUB-ACTIVITIES OF HERD MANAGEMENT

Pastoral nomadism or agro-pastoral nomadism, like any other economic venture, follows two phases in conducting an activities system. It is usually initiated with conceptual programming or planning the set of operations which is intended to be performed in the annual course, considering all information at hand e.g. evaluation of one's herd into age-groups, identification of productive livestock and those which are fallow, the total herd vis à vis the available labour (Dahl and Hjort 1976). The task of carrying out the planned sequenced set of operations will be followed through the labour organization devised.

In his study of the herd management of Lapp Reindeer nomadic pastoralists Paine (1964, 1972) discerns this form of behaviour in pastoral nomadic societies. He proposed the conceptualization of herd management as embodying the following interdependencies between these variables; herd, personnel and pasture(water). Husbandry and herding are taken as the two sub-operations under the herd management system (Cf. Paine 1972:76). His explicit distinction between husbandry and herding is worthy of further scrutiny. For these concepts allow us to make a deep analysis.

Husbandry is defined as a relationship between herd/and consumers or as a process of allocation of one's capital which in his case is the livestock. In view of this fact, the information at hand which is accessible to the manager on his capital and other resources plus his know-how, would be crucial for planning and later for executing his activities. Herding on the other hand is considered as the relationship between herd/pasture or the state of the control of herds during their grazing process (ibid:81).

The striking thing in this approach is the muddling of the water-pasture spatial room only in terms of labour, but not as a scarce and budgeted resource as often happen in social anthropological studies. For instance, he stressed that the problems of herding are those of economy of labour (ibid:79). Subsequently, when he attempts to make a distinction between intensive and extensive herding,

his whole argument is based on the circumstances of labour and herd. Explaining extensive herding for example, he wrote "it indicates that the animals for a long period of the year are not herded or herded very little" and the reverse of this condition implies intensive herding (ibid).

The omission of the spatial room of water-pasture resources which should have been treated coherently with herdsmen (human-labour) and herd population, made his explanation fall short of depicting the whole picture of pastoral nomadism. For instance, Gilg who placed more emphasis on water-pasture resources, indicated that this resource is scarce and budgeted.

"Le nomadism se conforme à la ségrégation dans l'espace et le temps de l'eau et des pasturages. En fait, ces déplacements sont bien complexes et très varies." (Gilg 1963:500)

A little further he continues:

"Dans le schéma general, car elles permettent au betail de profiter des paturages des regions accessibles uniquement aux pluies conservant ainsi plus longtemps intacts les paturages accessibles en toute saison (ibid:509)

Pehrson (1966:6-7) supported the same argument.

In other words, the consideration of water-pasture as a scarce and budgeted resource is very useful in mapping fully the spatial behaviour of pastoral nomadism. Besides, such an approach would be more rewarding particularly in understanding the dynamics of pastoral nomadic change or the intensification processes following the gradual reduction of the land resource. Along this line of argument, the other factor which needs reconsideration is, pursuing the husbandry activity would undoubtedly also require a conceptual evaluation of water-pasture conditions along the process of allocation of one's livestock. In reality, the concepts husbandry and herding are not separate concepts. There is a relationship between the two.

Whatsoever its drawbacks, Paine's distinction of husbandry and herding activities is worthwhile noting. This mainly because, it reminds us that access to information is vital in order to organize resources and undertake

operations, even for pastoral nomadic societies.

QUALITATIVE INFORMATION AS A NECESSARY ATTRIBUTE TO INTENSIFICATION

At this point, it is highly fruitful to accept that pastoral nomadism like any project of agricultural venture has basically the same problem vis à vis access to information. Hence, let me give an analogous example.

To fulfil the task of a small-farm project annually, it prerequisites at least, information on the size of the land available for cultivation, acceptable information on the yield of the same land, tools, labour, and obviously information with regards to a given household's needs and wants. In addition, it should be clear that the quality of information needed varies with the degree of intensification or technical involvement on a given farm. For instance, a farm under a multi-cropping system would undoubtedly need information of a relatively higher quality than a farm under shifting cultivation.

Hägerstrand suggested in his study of "Socio-Technical Ecology and Innovation" (1974a) that it is beneficial to divide the required information into two types when running such a project:

1. The technical know-how, that is, the knowledge how operations are organized and carried out. Such information or knowledge is carried over to others irrespective of its location.
2. Information dealing with all resources and barriers prevailing within the environment of the actor or he referred to it as information of a topographical nature (Cf. Hägerstrand 1974a:10-11).

In effect, these two types of information, directly or indirectly, are raised by Paine (1972) as pointed out earlier. Although pastoral nomads or agro-pastoral nomads are little affected by advanced technology, their knowledge of livestock rearing should not be underestimated. Particularly, their techniques of intervention on the herd suggest a higher skill. Many scholars are in agreement on this matter. For example Bonté et al underlined six different sorts of intervention.

1. intervention on the genetic of the stocks
2. " the composition of the stocks
3. " the general health of the herd
4. " the biotic food energy
5. " the pattern of displacements
6. " the aggregate herds.

(Bonté et al 1973:10-11)

Nonetheless, although the pastoral nomads undoubtedly have a great depth knowledge on appropriate techniques of intervention on their herds, their information on the bio-physical environment in which they are conducting their operations is still only partial. Naturally, this partial information on bio-physical environment, has also in turn effects on the technique of intervention on the social herd, particularly if they are in the process of changing the technique of rearing livestock qualitatively.

But, this discussion does not infer that even traditionally pastoral nomads were not at all interested in gathering information on their environment. Actually, they had different techniques of ameliorating the annual programming of their activities system. Some of these techniques utilized within the pastoral nomadic societies will be pointed out in the following statement:

"...Camp members are sent out to scout for good areas in the general neighbourhood and even to visit distant area to collect information on pastures, political climate, density of nomadic camps and opportunities for plowing contracts. On the basis of such information the timing and direction of migration are determined..." (Pehrson 1966:15)

Bataillon stressed the same facts on the Saharian pastoral nomads (1963:38). Leeds wrote on several of the Chukchi Reindeers herdsman methods of collecting information. For example, he mentioned that the head of each household often travels just for the purposes of gossiping which usually leads to exchange of information on the environment. Another method of acquiring information is, during the search for criminals, the search for a prospective wife etc... (Leeds 1965:104-106). Sweet also pointed out, that in North Arabia, there are a continuum interflows of information on the state of grazing areas between sectional chiefs (Sweet 1965:139). Leo Silberman said that a Somali herdsman who we encounter sitting in a Tea-shop

or Café is not enjoying his leisure-time at all. On the contrary, he is in a state of gathering information and evaluating the circumstances of the ecological niches in which he is going to carry on his annual activities (Silberman 1959:570-71).

This brief discussion on methods of collecting information suffices to understand how pastoral nomadic units attempt to do as much as they can to collect information in order to evaluate and organize the set of operations which are going to be carried out in the annual cycle. Yet, even if they use all the various methods of depicting information, still it will be inadequate. The main reason is because a mere collection of information while pursuing such activities is not satisfactory. Information is only valuable as a resource, if it is gathered from a specific place for a specific period of time so as to arrange efficiently the set of resources and undertake the sequenced operations in that specific place and time in accordance with received information.

Then, it is reasonable to question, what is the barrier which prevents a pastoral nomadic group from utilizing appropriately the information gathered of topographical nature? In the pastoral nomadic world, the unevenly distributed information of any given area is accessible to any other socio-economic unit of the same ecological niche. Thus, it is just a question of who received the information and reacted accordingly so as to exploit the available resources. As a result, any information in space and time that could be collected by actor or actors is highly variable. An open and prepared slot for the next operations may not exist as a slot after a short lapse of time. It could be occupied by another socio-economic unit who arrived first.

The interesting aspect is, that even the first occupant of the slot may not be able to exploit fully the available resources up to its expectations, because of the possible encroachment of others. Hence, it is wrong to conclude that pastoral nomads have no idea about the limitation of the capacity of space-time to permit the operations of a specific activity. They are in fact fully aware of this limitation. But, it is the absence of clear rules of ownership which gives it a different perspective. For instance, "Fulani herdsmen, incidently, fully understand the degradation that results from overgrazing, but feel that their own system of land-use, among other reasons, dissuades them from reducing herd size, since nothing

could prevent another herder from moving his animal onto the improved pasture." (Horowitz 1972:110)

In other words, the unclear rules of land tenure do not provide the right for individuals or groups of individuals to control resources within a given spatial room, although most of the pastoral nomadic unit claims a small portion of this ill-defined holding as a dry or winter season grazing land under its absolute control. As a result, the overlapping of programme of operations is a common event which prevails in pastoral nomadic societies. Subsequently, a socio-economic unit has always a blurred picture of its potential water-pasture resource. This obviously in turn establishes new constraints affecting both the organization of resources and performance. All in all, their economic life is full of risks.

In such circumstances, while embarking on such activities traditionally, they had various methods of minimizing the risks involved e.g. diversification of types of livestock, establishing well dispersed stock-friends in the geographical space which allowed the dispersal of one's herd or the borrowing of productive cattle when circumstances called for it. This traditional cooperative social organization (stock-friends) were and may even be today common among pastoral nomadic societies, particularly of East Africa (Schneider 1953, Lewis 1955, 1961, Widstrand 1973, etc...) On top of this, raiding and engaging occasionally with primitive system of shifting cultivation have been regarded as means of neutralizing risks.

However, in a context of a growing population pressure vis à vis existing resources, at the present-time, the impossibility of dispersing livestock from one location to another has been realized, particularly in those areas where internal and external forces are prevalent.

In other words, with population pressure, the access to the two types of information, that is, technical know-how and information of a topographical nature with higher precision will be a sine qua non prerequisite to plan and carry out the selected activities. Thus overlapping would not be tolerated and the necessity of acquiring the absolute right of control of a unit land (domain) will be apparent.

In reality, the tenure problems (or domain constraints) prevail in all types of human activities. Jones and Eyles's description of the conditions of the traffic of the early European cities is an excellent analogous illustration,

"The battle between pedestrians and non-pedestrians in our streets, which became particularly acute in the seventeenth and eighteenth centuries with the vast increased number of wheeled vehicles was settled by dividing the space giving the pedestrians a small portion a pavement and allowing the coaches to use the rest" (1977:139)

With further increase of vehicles, the same well-defined domain at the rudimentary level, gradually has given birth to the contemporary complex system of controlling vehicles and pedestrians e.g. automatic traffic light, sub-ways etc.. and facilitated individuals to drive or walk in harmony reducing the occurrence of accidents.

Similarly, as population pressure increases, the overlapping of activities of socio-economic units in a given environment would not be tolerated and the eagerness to adopt well defined modern rules of land tenure would be evident. Such desire for security of grazing and cultivating land is a common and observable phenomenon in most marginal regional spaces particularly in those parts which are under a relatively intensified land-use system.

Subsequently, it is reasonable to say that a better quality of information will permit a better organization of resources and performances of the sequenced operations in the annual course in a given unit land. The increase in productivity of a unit land will enhance expansion of services and other activities, which can be in turn an impetus of high magnitude for further investment of new inputs to increase even more, the productivity of the land resource. Hence, security of tenure improves the quality of information, that is, the technical know-how and the information of topographical nature, which in turn promote a better farm organization and performance. That is why, authorities on intensification argue that security of tenure in agricultural activities is one of the vital determinants in agricultural improvements (Cf. Boserup 1965:14, Clark 1977:138).

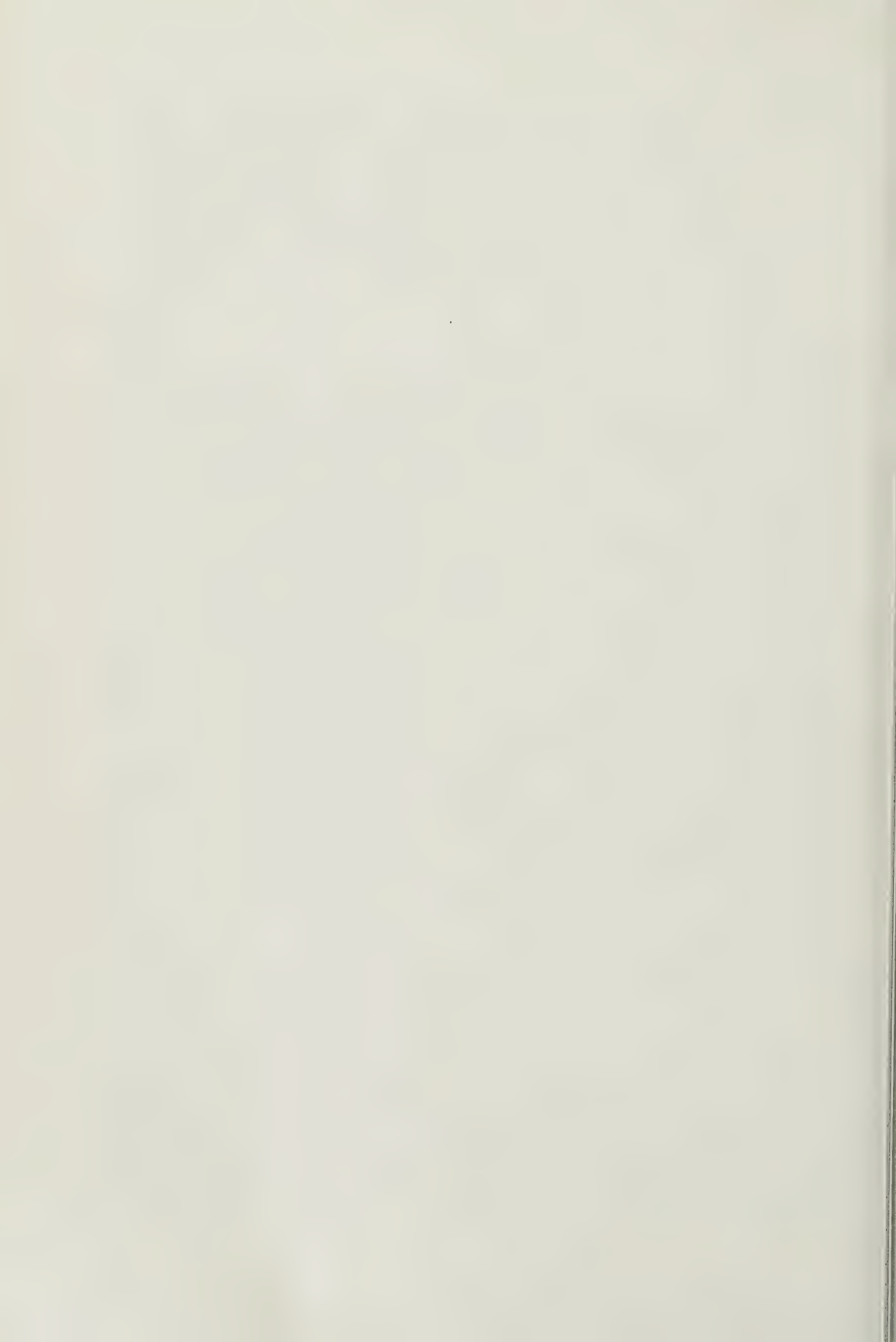
In such circumstances, the tendency to intensify further by eliminating fallow and natural grazing land, will begin in small-holdings. Whereas, in ranching the internal organization and performances e.g. livestock, crops, fodder production, become more and more complex. At this level of ranching, even the natural pasture will be conceived as crops (see for further information Andrae 1981:172). However, the success of this development cannot be determi-

ned only by changes initiated from inside, but as well by further influences from outside e.g. incentives such as conducive market organization, transportation system, a better national administration, new job opportunities, etc... Therefore, the understanding of these interrelated elements that should always be considered in one context, is a central issue in practical planning and policies formulation in the development programme of marginal areas.

Conclusion

The discussion was initiated by depicting in general the different constraints which pastoral nomads or agro-pastoral nomads have been facing in the past and over recent years. Then, to grasp more clearly these constraints, a short assesement on herd management by using the concepts husbandry and herding, a distinction forwarded by Paine was made. Subsequently, the importance of qualitative information in order to improve the organization of resources and to proceed with the packing process was highly stressed. After that, the attention was focused on the interrelationships between qualitative information and issues of rules of tenure (domain constraints), and between rules of tenure and farm organization and performance. Finally, it was pointed out how the structure of incentives can further enhance the on-going progress.

With such a broad theoretical and conceptual framework and general knowledge of the packing processes of the marginal areas, let me proceed to investigate my premise in real objective situations.



PART III A CASE STUDY

5 BACKGROUND, METHODS AND DATA

INTRODUCTION

The process of development of the Pokot people, that is, the change of their socio-economic conditions in space and time dimension cannot be viewed as a unique case. There are no as such essential differences from the other marginal spaces of Sub-Saharan countries of Africa. Hence, it is reasonable to conceive them, in one analytical framework. For example, most of the problems identified in other Sub-Saharan African countries have been or still are impediments to propagate a better quality of life among the Pokot people. If there is a dissimilarity, it is more a relative difference rather than of kind.

Surprisingly enough, a similar relative difference exists among the Pokots in view of how they exploit their resources. Nevertheless, I doubt the prevalence of pastoral nomadism "stricto sensus" even in the remote part of West Pokot. Like most of the contemporary pastoral nomads who are in the process of changing their socio-economic conditions, the Pokots as well are in a transitional period being influenced both by internal and external factors. But, the influences of particularly external factors are not distributed equally in the geographical space of the Pokot people. Whatever the consequences, the traditional socio-economic system has eroded. In certain parts the people are in the process of intensifying their activities system. Thus, what we observe today in parts of West Pokot are "coup d'essai" to establish mixed farms or commercial group ranches as long term goals. In spite of this fact, the conditions in some remote parts of this district are not far removed from the circumstances of the fifties.

LOCATION AND PHYSICAL ENVIRONMENT

The West Pokot district is situated within the rift valley province immediately south of the Turkana and west of Baringo districts (see fig. 6). Its south western boundary defines as well, a part of the high potential agricultural land of Tranz Nzoia, a district which was alienated to

European settlement during the colonial period. In south-east, the Elegeyo Marakwet district is its neighbour. While in the west, it shares the international boundary with Uganda.

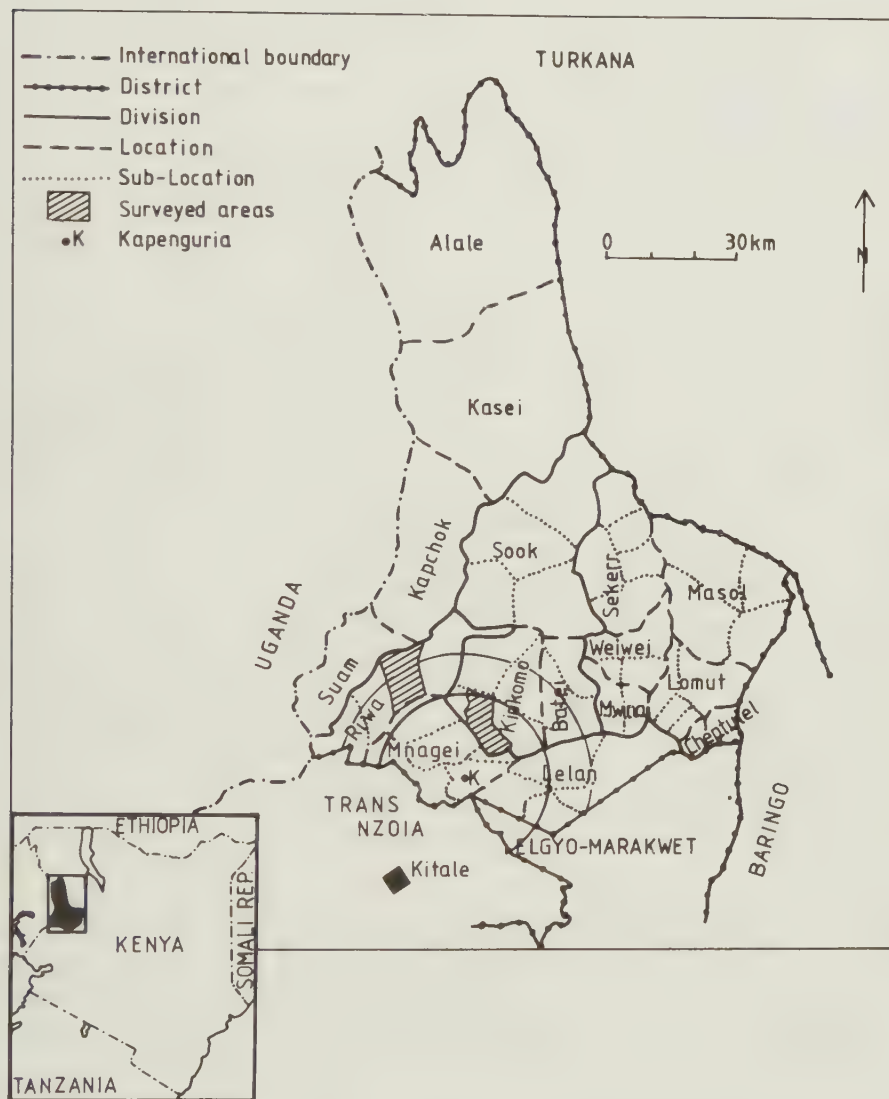


Fig. 1.5. The geographical location of West Pokot and its neighbouring districts.

The Pokot people have as well an environment which shows great diversity in altitude and topography with

the high rugged hill masses rising to altitude of 3350m. in the eastern part of Cherangani hills and descending to the semi-arid plains to as low as roughly 900 m. in the north western part of the district. Many of its rivers which flow in its deep valley and escarpments are seasonal except the Suam river which flows from Mt. Elgon to the Turkwel gorge in the north west, and Weiwei, Muruny and Iun rivers in the east.

Subsequently, its eco-climatic regions reflect clearly its altitudinal and topographical diversity varying from eco-climatic zone I to extreme zone V (see table 1.5).

Table 1.5. The eco-climatic zones of the district.

Eco-zone	Altitude (in m.)	Average Annual Rainfall(in mm.)	Aug. Annual temperature(^o c)
I	2439-3370	1200-1500	9-13
II	1830-2300	900-1290	13-17
III	1750-2200	1000-1200	15-18
IV	1150-2000	700-1000	16-25
V	1000-1500	700-900	25-33

The source: M.o.A ,West Pokot Annual Report-1981 pp.2. For further detail information on the eco-climatic zones see Pratt and Gwynne 1977:42 , Gwynne 1977 :4).

On the whole, it can be said that the annual cycle in West Pokot can be divided into a) the rainy season from April to August, b) the dry season from December to February, and c) the transitional season from September to November and March (Gelens and et al 1976:11).

THEIR ORIGIN AND EARLY SETTLEMENT

The Pokots who were referred as "Suk" by the British during the colonial period, are part of the Nandi or Kalengin speaking people. For many years, they were distinguished by anthropologists and ethnologists as the southern Nilo-

Hamitic group* of tribes (Huntingford 1953, Peristiany 1951, Schneider 1953) and as having affinities to the two sub-groups that is, the Nandi, Kipsigis, Dorobo, Elgeyo, Kamasya, Sapei, Kony, Marakwet and Barbaig in Western Kenya and Northern Tanzania who are distinguished as the 'Nandi speaking peoples' and the Masai, Samburu and Njemps in Kenya and Tanzania as the 'Masai-speaking peoples'. However, most of the available literature laid more emphasis on the close cultural and linguistic affinities between the 'Nandi-speaking' and the Pokots. Peristiany (1951) stated, for instance, that the Kipsigis regard the Pokots as brothers. Brown (1977) observed the existence of a cultural closeness between the agriculturalists' Pokots and the Nandi. The Pokots are not only influenced by tribal origin but by location factors as well. Consequently, in certain aspects a cultural similarity between the Pokots and the Karamojong or Turkana has been established, suggesting strong interrelationships and influences between these neighbouring peoples (Schneider 1953:36). Yet, this cultural influence has not been realized through a peaceful co-existence. On the contrary, several bloody cattle raids and struggle for important grazing areas between them were reported (Totty and Chaundy 1944, Docherty 1957 Dyson-Hudson 1969, Cox 1972). A good example is, the Pokots and Karamojong conflict about Karapokot or Karasuk grazing land (Braznett 1958). As a result of this conflict, Karapokot was handed in 1926 to the Kenyan government. But, it was given back to Uganda in 1931 and remained under its administration until 1970, when it was officially integrated again into West Pokot district to strengthen the neighbourly relationship between the two independent states.

In any case, in the historical tradition, it was consistently recorded that the Pokots primarily were living on Mount. Elgon with the other Nandi speaking Nilotic peoples and from 1800 to 1840 they spread out by splitting up into two directions, to the south the Nandi and Kipsigis... and to the north west the Pokots, Elgeyo and Marakwet.

*This linguistic distinction between the nilotic peoples has been a debatable issue for many years. Recently, it was rejected and today all are referred to as simply, "Nilotic" group (Sutton 1974). Hence, the Pokots preferably can be called as Nandi speaking Kalenji nilotes.

These records clearly account for the considerably fluid nature of the Pokots' settlement patterns (Dundas 1910, Sobana 1979) depending mainly on livestock, although there are contradictory opinions among these early studies, on whether they were originally crop farmers who descended to the plains to become pastoral nomads or were pastoral nomads from the beginning.

However, since the beginning of this century, it has been ascertained that the people's mode of living obviously reflects the bio-physical 'environments' diversity, that is, pastoral nomadism in the plains and crop farming in the highland areas. Hence, they are in literature divided into two functional groups as the agriculturalists (pipapegh) and the pastoral nomads (pitpatich) (Schneider 1959:152, Brown 1977:1). But, Dundas (1910) noted that it is a great error to describe the high Suk (Pokots) or the agriculturalists and the pastoral nomadic Suk of the plains as two distinctly different tribes. There is in contrast no essential dissimilarity between the two, e.g. livestock are the most valued possessions for both even if the number of the stock of the agriculturalists is smaller compared to the pastoral nomads.

The political organization of the Pokot was segmentary and acephalous. Power, as in other East African tribes, is not in the hands of heads of lineage or clan, but in council or elders (kokwas) in each neighbourhood* (or referred to as Korok) (Conant 1965, Widstrand 1973). The "Korok" was a largely autonomous political unit. On occasions, several councils of elders could join together temporarily to form a judicial court to settle inter-neighbourhood disputes. The elders were always chosen democratically for their quality of leadership. In effect, the best way of examining how traditional political organi-

*A neighbourhood or "korok" was a domain of a group of homesteads or households defined by some natural features e.g. ridge, river etc.. Both Conant (1965) and Widstrand (1973) regard it as a physical and social unit. But, the conception of korok as a social unit is highly questionable. Brown supports this argument (personal communication). This is mainly because each korok is mainly formed on a voluntary association of individual households from different clans or even tribes, suggesting the high inter-connection in the geographical space beyond their specific korok or neighbourhood both by economic or non-economic factors.

zation functions is through a discussion on the traditional rules of land tenure.

LAND TENURE

The traditional land tenure

Like all the other African tribes in Kenya, until the coming of the British the land tenure of the Pokots was governed by their unity and strength which determine the outer limit of their domain. Internally very flexible customary laws fit the fluid nature of their settlement pattern. Describing these situations, Huntingford wrote:

"In late pre-European days the Suk (the Pokots) suffered much from Turkana raids and in consequence had no settled boundaries. They were at this time an extremely fluid people, and their movement may be compared with that of a rubber-ball squeezed in one place, they bulged in another." (1953:78)

In other words, for the Pokots, land was conceived as a vast resource which belonged to countless families, that is, to the ancestors (the dead), the living and the many unborn. Consequently, all lands which were customarily used in some form of rotation for grazing or cultivation purposes, were an open potential land resource that could be allocated for whatever activities they wished to pursue.

Subsequently, like the pastoral nomadic societies' holdings elucidated earlier in the methodology section (see chapter 4), the Pokots' holdings as well, were vaguely defined areas due to their manner of occupation consisting of a series of stations of water-pasture resources over a period of time. But in most cases, each sub-unit e.g. a neighbourhood, tends to move within a limited area. The members had a system of holding determined by the size and types of activities, the location of the centre of their settlement and of the dry season water-source. That is why, such territories of the sub-units can be clearly observed when encroachments by other units are resented during the period of scarcity of water-pasture resources.

As stated earlier, the sovereign authority which exercised full rights to allocate piece of lands from the total domain of each sub-unit or neighbourhood is the "Kokwas"

or the council of elders. Stressing this prerogative of the elders, Schneider remarked, "the old men play a prominent role in directing community activities of a secular and religious nature" (1959:145). What it means is that for all land which was made available at a given time, the council of elders used to make sure that each member of the neighbourhood enjoyed access to water-land resources for cultivation or grazing purposes. This right automatically defined the individual's duties and obligations to his co-members of the given neighbourhood. Rights to land in a neighbourhood and obligations to its other members were inseparable.

In addition, the elders had power to allocate labour for maintaining irrigation canals (e.g. Weiwei) from the total labour available under their jurisdiction and it was also their prerogative to close and reserve a given grazing area for scarcity periods.

Usually, their decisions were implemented indirectly by sanctions (Peristiany 1954:17-24). Illustrating one such case Schneider said:

"...closing an area automatically resulted in the application of sanctions to anyone violating the restrictions. The area was policed by young men and anyone found in it was fined an ox..." (Schneider 1953:198).

Therefore, the traditional system of land tenure of these people used to consider not only the actual circumstances, but the past and the future as well. Similarly, their system of land management was based on the events of the past, the present situation and the future expectations of the council of elders which in turn are determined by the wishes of its members.

The colonial land policies and the traditional land tenure

After the formation of the East African protectorate, the British land laws and their policies towards the Africans were the primary factors that eroded the customary rules of land tenure and established in its place an ambiguous system which was neither close to the traditional tenure nor to the land laws of the colonial government. This situation has even prevailed up to our time under the independent government.

The first promulgated law of the 1901 Order in Council,

in actual fact, laid down that no native has any individual entitlement to land. For, the law gave more or less full power to the colonial administrators to dispose of all waste and unoccupied land by designating it as "Crown Lands" (Okoth-Ogendo:1976). Thus, the very dynamic nature of pastoral nomadic societies which does not entail permanent occupation of a parcel of land, would automatically put it under waste or unoccupied land. As a result, during the alienation of land for the British settlers, the ethnic groups which had been tremendously affected were the pastoral nomads e.g. Masai, Samburu, Nandi, etc...

Following this, the formation of "native land units" was carried out. This implies the fluid nature of the traditional boundaries which varied in accordance with different ecological or political circumstances, were no more in practice. Its consequences are manifold. Okoth-Ogendo described it, as follows:

"The establishment of fixed ethnic boundaries badly disturbed the equilibrium between patterns of land use and the availability of land, a balance which had been maintained through the system of shifting cultivation or nomadic pastoralism. The consequences were first, a very rapid deterioration of land due especially to fragmentation, overstocking and erosion. Secondly, an equally rapid disintegration of those aspects of the social and cultural institutions relating to land use control that could be mobilized to cure the general malaise and thirdly, increasing outmigration by those who could no longer find enough land to subsist on" (Okoth-Ogendo 1976:15)

In the first quarter of this century, the Pokots were also pressed from two sides, from the northeast by the Turkana and from the south by British ex-soldiers who settled as farmers in the present Trans Nzoia district, an area which was earlier used by the Pokots. This, actually, is considered as one of the factors contributing to the accentuation of Pokots incursions to the west on Karamojong land, that is, Karapokot or Karasuk (Henkel 1979:70). Thus, West Pokot as a district was known around this time and the colonial administrative system was introduced e.g. the office of District Commissioner, Chiefs, headman and native court tribunals etc... These institutions gradually eroded the prerogatives of the council of elders, though they were not accepted immediately by

the people. As a result, it had diverse implications on the traditional land tenure. For instance, the then district Commissioner, J.Barton parcelled the district into several locations and appointed a chief in each without any regard to the traditional political organization. Furthermore, Barton had a strong conviction that the restriction of the traditional movement of herdsmen and livestock, would endow him with full control of the pastoral nomadic people in his district. Consequently, individuals or groups of individual herdsmen were forbidden to leave their native locations (Schneider 1953, 1959) which means to say that the pattern and process of their land-use were forced to be different from their traditional patterns.

The alienation of land for settlers and the formation of defined native lands also forced some other ethnic groups to encroach upon marginal areas such as West Pokot. It was at this time that the Nandi, Chepkos, Kitosh and others started to settle down in West Pokot (Agricu Gazetter 1955:14, Schneider 1953:58). Subsequently, the feeling of insecurity regarding the right to their traditional land resources became the Pokots' common experience.

For the first time, in the fifties, the colonial government showed some interest in changing the agricultural conditions of the so-called native lands. The detailed plan was presented in the programme referred to as "The Swynnerton Plan of Intensification", a programme plan which covered 1954-56. This reform stressed the need for introducing a private land ownership system, and undertaking at the same time, consolidation and registration of land in the high potential agricultural land.

Nonetheless, the Swynnerton Plan, when it comes to the marginal zones, gave vague land policies simply emphasizing isolated projects e.g. the need for accurate survey to acquire basic data, the improvement of grazing land management, the provision of services such as control of livestock diseases, and water source constructions. In association with these issues, there are remarks in the plan about the existing projects of West Pokot-Riwa and Kipkomo grazing control schemes and borehole constructions (1955:35-44). The projects were financed at that time by the African Land Development (ALDEV).

In general, it was clear that the land tenure of pastoral nomadic peoples was left without a clear land policy in contrast to the intensively cultivated part of Kenya. This was indicated in the 1959 Land Act (Okoth-Ogendo

1976:166-67)). But, this does not mean that the colonial government had not realized the rapidly deteriorating rangelands of the pastoral nomadic peoples. Since the middle of the thirties, they had isolated projects such as grazing schemes to reduce the problem of overstocking, disease control, introduction of a progressive tax system, marketing organizations etc...(M.o.A 1962, York 1967). These interventions, obviously, had established pressure on land resources and undermined as well the traditional authority by promoting the emergence of new land-use patterns.

Land tenure during the Post-colonial period

After independence, the Kenya government was greatly interested in maintaining the same policy with a slight improvement. In other words, the acceleration of the introduction of freehold title to land, consolidation and registration of land both in highly fertile parts of Kenya and in its marginal regional spaces, are seen as the cornerstones of the rural development programme.

Particularly, land registration was considered as the most essential programme in the marginal zone. This is mainly because that the "encroachers" who were settling in the marginal areas were increasing rapidly in number and it was necessary to control this new development. Secondly, since some of the enlightened pastoral nomads who had knowledge of what was going on in the high potential agricultural areas, had started to enclose large fertile grazing areas to give a sense of occupation to the authorities (Davis 1971, Hedlund 1971, Doherty 1979, Osolo-Nasubo 1975). Thus, there was a general feeling among politicians that this process could expand quickly to other parts and may lead to serious problems. Finally, there was a general consensus on the importance of land registration as a condition for external loans. Simpson puts all these facts in a nutshell,

"A system of land registration is considered essential to rangeland development. Unless an individual or an association of individuals are given exclusive use of a particular piece of land, they have neither incentive nor ability to control grazing and diseases and improve the genetic composition of their livestock. Modernization also requires credits and this facility

by legal title to the land for provision of security for loans" (Simpson 1973:4)

As a result new legislations were promulgated (the Land Title Adjudication Act, 1968 and the Land (Group Representative) Act, 1968, as a legal foundation for the formation of group ranches. It is argued that the 1968 Act was passed mainly to deal with those areas which had not been affected by the consolidation programme introduced earlier (Okoth-Ogendo 1976:167). Specially, the Land (Group Representatives) Act, 1968 was enacted to clarify further the implication of registering a rangeland, to group ranches. For example, it explains that the land and introduced facilities will be owned collectively by the group. It states further the tasks and the power of the elected group representatives. For example one of their prerogatives is to mortgage the land of the members so as to provide the members with facilities such as cattle dips, boreholes or dams and other inputs which enhance the quality of life of the people in question (Development Plan 1970-74:268).

It should also be clear that the land Act of 1968 is formulated in such a way that it can even accommodate individual freeholds of single or extended families, whenever it is found appropriate by the land adjudication officers. For instance "group" is defined in such a way as to include anything from a tribe to a nuclear family (ibid Okoth-Ogendo:177).

Therefore, the idea of a group ranch is, in a sense, the extension of the national policy which has been emphasized since the fifties with a slight modification.

This new land policy was implemented in West Pokot in the seventies. According to the five year plan of 1970-74, it was aimed at adjudicating an area of 230 thousand hectares consisting of 120 thousand hectares of small agricultural families holdings and 110 thousand hectares of group ranches (see table 2.5).

The five year development plan of 1974-78 does not specifically mention, whether the target of the preceeding five year plan was fulfilled or not in West Pokot. But, it notes that the Land Adjudication programme will be further extended and significant progress will have been made by the end of these planning years (Development Plan 1974-78 part I:219). Thus, these records suggest that the strategy is to gradually implement the adjudication programme in the rangeland or marginal zone.

Table 2.5. Land adjudication programme in West Pokot.

	1970/71	1971/72	1972/73	1973/74	Total
Agricu. Areas (smallholdings in hectares	3000	18000	38000	61000	120000
Range areas (group ranch in hectares	-	-	-	110000	110000
Total					230000

The source: Development Plan 1970-74 pp. 282.

Today, the types of land tenure that can be identified in West Pokot are:

1. Land under the county council trusteeship (a major part of the district)
2. Private land ownership
3. Group ranch ownership
4. Public land (e.g. gazetted forest land)

Nevertheless, the major agricultural changes in W. Pokot cannot be assessed only on the basis of changes in land tenure. There are other organizational and significant external factors which have played prominent roles, particularly in the sixties and seventies e.g.

HUMAN POPULATION

The district represents today a total of about 9277 square kms. and a human population of 158652 (1979 census). But, it had only 22026 people in 1942 (Henkel:1979), which means, it doubled between 1942 and 1969 (excluding Karapokot) and in the last ten years, has increased by 64.5 per cent. In spite of this fact, the low density shows somehow the marginal nature of its land resources.

However, one should bear in mind that the human population is unequally distributed in the geographical space e.g. a large part of Karapokot is practically uninhabited. At local level e.g. sub-locations, there are areas which

Table 3.5. Population of West Pokot (by division and location).

	Total Population		Total Density (in km ²)	Population Density (per sq. km ²)	
	1969	1979		1969	1979
West Pokot	96254	158652	9277	10	17
Kapenguria(D)	32217	55954	1463	22	38
1.Mnagei (loc.)	20305	35186	435	47	81
2.Riwa	6104	9619	475	13	20
3.Lelan	5808	11149	555	10	20
Chepareria(D)	24063	35089	1792	14	20
1.Kipkomo(loc.)	8375	14628	485	17	31
2.Batei	7022	11136	277	25	40
3.Sook	8666	9325	1030	8	9
Sigor(D)	26178	34225	1992	14	17
1.Weiwei(loc.)	3988	5515	250	16	22
2.Lomut	5108	6687	289	18	23
3.Sekeer	4079	7154	490	8	15
4.Mwino	5408	7157	142	38	50
5.Masol	4036	3474	724	6	5
6.Cheptulul	3559	4238	97	37	44
Karapokot(D)	13796	33384	4031	3	8
1.Alale(loc.)	1719	13542	1603	1	9
2.Kapchok	3763	7452	693	6	11
3.Kasei	5156	4877	1389	4	4
4.Suam	3158	7513	346	9	22

The source: Kenya Population Census of 1969 vol.I, Nov. 1979, Population Census of 1979 vol.I, 1981, M.o.A West Pokot Land Development Division 1980: 3-6, and Henkel 1979. N.B. In the Census of 1969, Karapokot division was still a part of Uganda and it was incorporated into Kenya in 1970. In the above table, it is included in W.Pokot so as to facilitate the comparison with the census of 1979. Thus, the district had a population of 82458 in 1969. In addition, a new division was created in 1979 that is, Chepareria taking Kipkomo and Sook from Kapenguria division and Batei from Sigor division. As a result, the size of these divisions and locations has been adjusted based on the information acquired from (M.o.A West Pokot Land Development Division 1980:3).

suffer from population pressure (1979 census). Particularly if we consider the excessive population in terms of existing resources, the discrepancy will be considerable.

West Pokot district had different administrative sub-regional units over the historical course. But recently it was sub-divided to facilitate the administration system, into four divisions; Kapenguria, Chepareria, Sigor, and Karapokot, and each in turn was sub-divided into locations and sub-locations (see, fig 1.5). Subsequently, its leading division, Kapenguria has 55954 inhabitants followed by Chepareria by 35089 inhabitants. The table 3.5 clearly indicates the imbalanced distribution of human population at division and location levels and it shows indirectly that the density at the district or division level gives insignificant information. Yet, even at these levels, we observe in part of this district quite a rapid increase in human population.

ADMINISTRATION AND INFRASTRUCTURES

The district is administrated from Kapenguria through the office of the District Commissioner. But, its commercial centre is Makutano where the various daily trade and other services are undertaken. It is about four kilometers west of Kapenguria. In fact, Makutano is already considered as part of Kapenguria and a place of great potential for further growth by town planners. Consequently, it is selected as one of the centres in which rural housing will be sited.

A large concentration of governmental institutions, economic and social services are found surrounding these two major centres e.g. various types of maduka (shops) bars, lodgings, hospital, dispensaries, primary and secondary schools etc...

However, primary schools and maduka are fairly well distributed in the district, although the accessibility to these services can be rated as still low in comparison to other part of Kenya e.g. seventy-nine centres throughout the district have access to primary schools (M.o.B.E. Annual Report 1979:2).

West Pokot was regarded until recently as one of the more remote areas of Kenya although its neighbouring district, the Tranz Nzoia is one of the settlers' highly developed agricultural zones. Today, the situation is completely different, particularly in relation to Kapen-

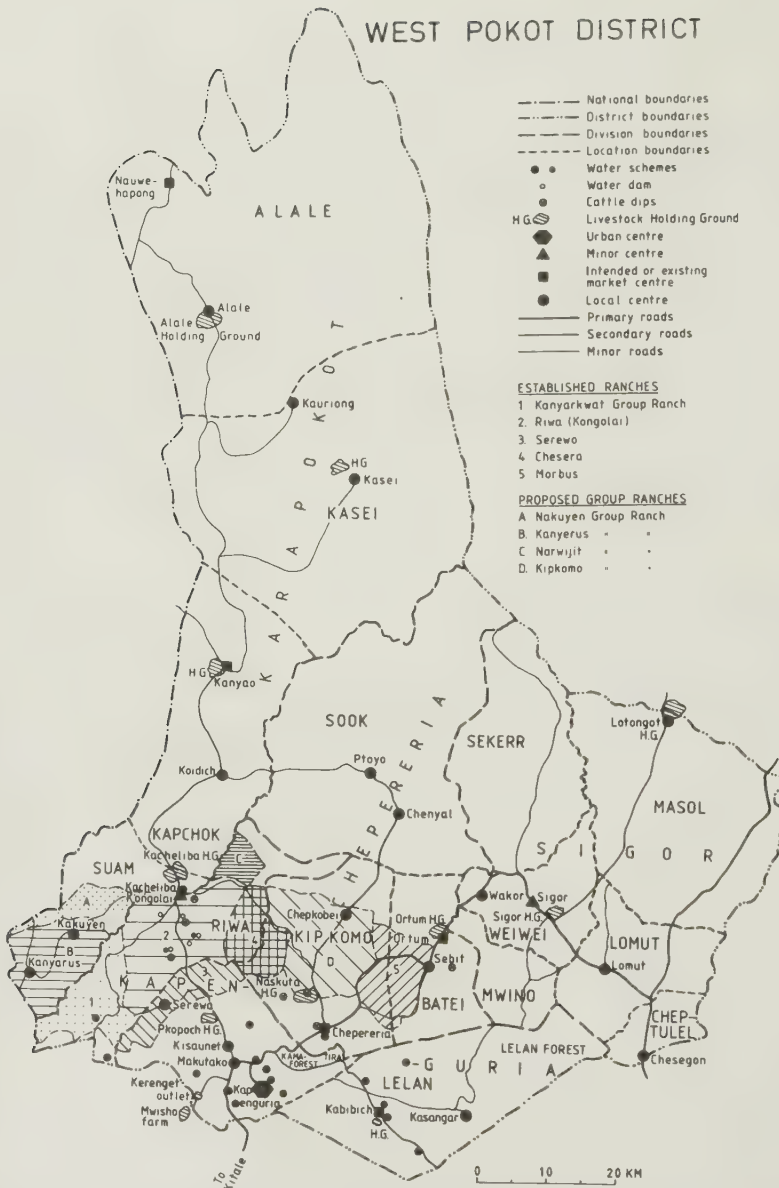


Fig. 2.5. The existing and proposed development projects in West Pokot district up to the end of 1979.

guria and Chepareria divisions. The road Kitale-Makutano-Kapenguria is asphalted and the Kitale Makutano-Orthum is under construction. Many of the other centres of settlement are connected by all-weather roads (see fig.2.5).

As a result, the 'matatus' and bus services have increased so much that it can be said that the two divisions mentioned above are well integrated with Kitale, the headquarters of Tranz Nzoia district and the relative distance to Western Province is getting shorter nowadays. Trade is also expanding. Consequently, there are bus services operating daily from West Pokot to Western Province. Furthermore, the introduction of cooperative organizations, the promotion of marketing of farm produce and inputs, extension agents etc...have been some kind of sign for the on-going changes.

Summing up this introductory background on the Pokots, it is reasonable to say an analysis of on-going changes of socio-economic units (a single or extended household) should take as the core of the analysis, the rule of land tenure and its change over time, the internal organization of resources and the structure of incentives which prevail in the environment. These constraints are not actually separate from each other. Each has an impact on the other in different ways as indicated in the methodology section.

Therefore, it will be the main interest of this study to indicate the implication of these constraints at micro-level. Finally, while I raise the constraints of the structure of incentives, I also intend to question the sectoral linkup or interdependency between micro and macro level.

METHODS OF STUDY

A number of different strategies of data collection and processing were used during the field study. The field work took place between February and the beginning of December, 1979. The result of the 1979 survey indicated the need for certain additional information. A second visit, therefore, was made in 1982 for a period of six weeks during which further discussions with local people and government officials on already processed data were undertaken.

Review of the literature and access to statistics

As in all marginal areas of Kenya, the available literature on West Pokot consists mainly of the works of anthropologists and historical accounts. Very few studies by other specialists exist. On the other hand, there are

series of governmental publications covering all sorts of subjects, particularly on on-going progress and development programmes e.g. The West Pokot District Annual Reports, which date back to the fifties are available in the District Commissioner Office and in the library of the Ministry of Agriculture, Nairobi. The two reports of S.R.D.P published in 1973 and 1975 by the Institute of Development (I.D.S) are some governmental publications worth mentioning.

The progress of the group ranch in Kongolai is also raised in some books and research publications. This is because the current group ranch has been associated with previous experience of grazing schemes that date back to 1954. In addition, literature on marginal areas of Kenya and other African countries which is abundantly available, has been used whenever it is of relevance to the circumstances of the areas studied.

Therefore, all these studies supplied valuable information in one way or another to put in a single framework the different events of past and present. Nevertheless, reliable data at micro-level are more or less still missing. The recent statistics from the Kenya Population Census of 1979, is a real break through the traditional obstacles. Statistics are made available even at sub-locations level in West Pokot, although errors still can be detected. The Central Bureau of Statistics as part of the Integrated Rural Survey (I.R.S) programme has been collecting reliable socio-economic data from Kapenguria Division 1978 with the objective of supplying up-to-date information on socio-economic trends. This programme was extended to other areas after my first field survey.

Discussions with local people and government officials

Informal discussions were held with chiefs, district officers and other officers representing the different divisions of every Ministry represented in West Pokot. Particularly, the Range Management District Officer, the Agricultural District Officer and the Land Development Officer have provided valuable information and assistance.

I have also tried to exchange views with researchers of different institutions involved in development programmes of the marginal areas of Kenya e.g. Institute of Development Studies, Dept. of Geography, University

of Nairobi, UNESCO and with researchers involved in Kenya marginal/semi-arid lands pre-investment inventory.

Field work

The two areas Chepareria and Kongolai were selected as survey areas mainly with the conviction that they are the best areas that can enlighten us on the on-going socio-economic changes in West Pokot. In addition, their practical location and accessibility to enumerators were also considered.

The sampling unit is a single or extended household. Since there were no statistics which indicate the number and location of households in the selected study areas, the first task was to identify all households in the physical space and mark them on a base map.

The survey of Kenya allowed me to use the maps of Kipkomo and Riwa locations, scale 1:50 000, which was used in the Kenya Population Census of 1969 for this purpose. At that time, before undertaking the 1969 sampling task, each location was sub-divided in the following way:

- a) The location boundary as enumeration division boundary.
- b) The sub-location as enumeration sub-location boundary.
- c) The sub-units of sub-location as enumeration area boundary.

Thus, Kipkomo location is divided into three sub-locations. One of them is Chepareria which is again sub-divided into five enumeration areas. I selected two of them as the first survey area which will be referred to from now on as Chepareria. Riwa location has three sub-locations, Kongolai being one of them. In turn, Kongolai is sub-divided into three enumeration areas. Two of them were identified as the second survey area and will be called Kongolai in the coming chapter. Subsequently, the delimitation of the two areas studied is consistent with the accepted official division.

To facilitate the task of identification of the location of households, the available maps were blown up to scale 1:25 000 and a net of grids were over-imposed on these. Then we visited each single or extended household in Chepareria and wrote a number on each door and a corresponding number was marked at the same time where a given household was located on the base map. In such a way, 342 households

were identified. Finally, by a simple random sampling procedure, I selected 30 per cent of the total households, that is 103 single and extended households as the sampling units in Chepareria. (see fig.3.5a) Each headman of a household was interviewed based on a prepared questionnaire.

The circumstances in Kongolai were entirely different from Chepareria. For, instance, at the beginning I detected that their settlement looked like small scattered islands in the geographical space of Kongolai, each island consisting of a cluster of households. As a result, a cluster sampling was thought to be an easy and less laborious approach. Thus, the sampling unit became a cluster of households. We registered thirty clusters (or "Manyatta") and ten of them were selected randomly comprising sixty-four households. All headmen of these clusters were interviewed. (see figure 3.5b) Besides, since I was interested in determining precisely the total size of population, we were forced to register all the households existing in the other twenty clusters. In total, 220 households were found as residents of the second survey area.

Questionnaire and difficulties

A questionnaire form (appendix 4) was used to obtain information at household level and it consisted of four parts a) human population and characteristic b) livestock resource c) land holdings and cultivation d) general information.

The questionnaire, at the beginning, also had another additional section which dealt with labour allocation over a given period of time. However, most of the headmen had difficulties to remember such details. As a result, I was forced to abandon this specific part. I realized that a series of interviews over a period of time were necessary to depict such information and such tasks were beyond my capacity.

The enumerators and I also faced a number of practical problems during the process of collection of data. For example, to acquire accurate information on age, we decided, as a rule, to ask for their I.D. cards, issued to all adults for 1979 parliamentary election purposes. Still errors were detected easily in some cases by a simple look at the individuals in question, e.g. overestimation of ages. Questions on mortality were rejected by res-

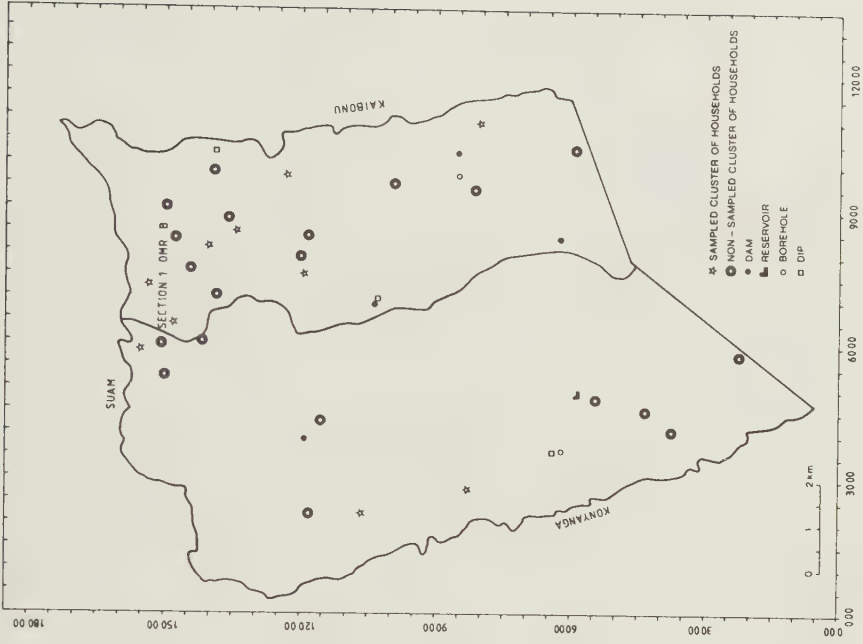
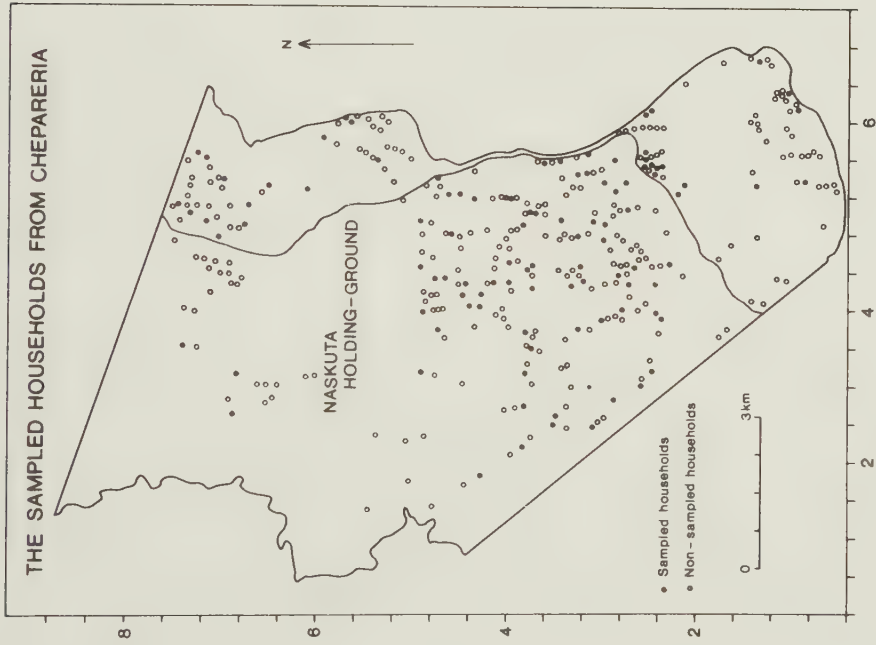


fig.3.5a and 3.5b. The two sub-regions surveyed in this study, and the location of households and clusters of households sampled and non-sampled.

pondents because it was a culturally unacceptable topic for discussion. Furthermore, three headmen refused to supply us with information on their livestock resources in Kongolai, although this part of the questionnaire was supplied purposely after we acquainted ourselves with the people concerned.

Identification of households in physical space and marking them on the base map demanded very tedious work for all (four persons) involved in this task during the first month of the field survey, particularly in Chepare-ria. These are only a few examples of the difficulties encountered during the field work.

On the whole, we were able to establish a good relationship with most of the headmen of the households in both areas. Since the enumerators were residents of the same areas and were aware of the general situation of most of the families, I believe that I succeeded in acquiring reliable data except in parts where I indicated my doubts.

Data processing

The data processing was carried out in Sweden and all information collected was stored and subjected to computer analysis through the use of a system of computer programmes referred to as Statistical Package for Social Sciences (SPSS) assisted by a professional programmer.

Computer mapping

The above sampling procedures allowed me to exploit the advantages offered by computer not only to tabulate the processed data in different ways but also to use computer mapping techniques. Subsequently, the location of each household was assigned X and Y coordinates on the two axes during the data processing and it was made easy to print any values needed from the data file using the gridding technique in order to display the processed data in some type of contour map to compare the different values distributed within a sub-region or between sub-regions. (the contour map is interpolated by UNIRAS, GINTP and plotted by NAG : Numerical Algorithms Group Ltd. (Oxford) routines in the programming package (see further the procedures on appendix 3).

LIMITATION OF THE SURVEY

As indicated earlier, the main theme of this case study is to depict existing constraints and opportunities which affect in one way or another the development process of the people who traditionally have been pursuing pastoral nomadism but who are today in the process of establishing mixed farming or commercial ranching. Obviously, if I had access to more detailed statistics on past situations and if the field work had been prolonged for some years, the result would have been even more valuable to deepen our understanding of the process of development in these areas. But, my financial situation and lack of time limited the main field work to one annual cycle (1979).

Nevertheless, I have endeavoured to minimize this limitation by accounting the evolution of circumstances in the past in a dynamic descriptive way and integrated it into the result of the field work as representing the past, the present and hinting as well on the future situation. In any case, such limitations are inevitable when one deals in a field which was neglected in the past by researchers and planners. Secondly, although I have described extensively the district in the introductory part, this case study does not intend to represent the case of the whole district of West Pokot. On the other hand, it gives a profound insight into the parts of West Pokot which are influenced both by internal and external factors of change.

6 THE RELATION BETWEEN BIO-PHYSICAL ENVIRONMENT, LIVESTOCK AND HUMAN POPULATION

INTRODUCTION

In the methodology part, I presented a detailed discussion, stressing the importance of regarding the natural bio-organisms (e.g. pasture), not simply as a source of energy abundantly found in geographical space, but as biotic food-web resources with variable distribution in space as well as in time. Besides, their precarious characteristics, their utility as resources should be recognized only with the presence of water sources for domestic-animals. Otherwise, their utilities will be limited only to the wet season. All these facts suggest that it is a scarce resource. Nonetheless, often in research works of social anthropology, sociology and geography, the natural bio-organisms are treated indirectly in association to livestock, to which greater attention is given. The qualitative assessment of the natural bio-organisms (pasture) like domestic bio-organisms (cultivated crops), is more or less an unrecognized field of study, albeit there is evidence which indicates that pastoral nomads allocate their sparse land resources differently in the annual cycle (see page 43).

Today, international organization such as FAO, UNESCO and few individual researchers, by following closely the spatial behaviour of pastoral nomads, have been able to ascertain that bio-organisms of different species in a unit land can nourish with greater success two or three types of livestock without damaging the natural bio-organism covers than when it is used solely for one type of livestock e.g. cattle (FAO/EMASAR 1977c, UNESCO, MAB report 1972, Pratt and Gwynne 1977, Gwynne 1977). Furthermore, the proceedings of the international seminar held at the Regional Centre for Agrarian Research and Development, Badajoz-Spain (1975:32) recommended it as a useful tool to bring the same agronomic approach applied to cultivation of crops, to the study of different biotic food-webs.

Actually, it seems that the main reason for neglecting such qualitative analysis has been the presupposing of "overstocking" and "overgrazing" which is believed to

prevail practically all over the marginal areas of most developing countries. As a result, it is not unrealistic to say that most researchers of marginal regional spaces seem to be possessed with the idea of "overstocking" even before establishing the fact whether the stock is over the carrying capacity of a given bio-ecological regional space. Subsequently, destocking is believed to be the only option to the prevailing problem and qualitative studies of both water-pasture and livestock are considered as a secondary matter.

The idea of "overstocking" was stressed as a burden for the entire rangeland in Kenya in the early colonial period. Nevertheless, there are authorities who claim that it was a stepping-stone to a more rational way of increasing revenue rather than a manifestation of serious concern for the deterioration of natural vegetation in the marginal areas (Sobona 1975:39). This is not to say that the pastoral nomads do not accumulate and destroy the natural bio-organisms of their environment. They may in certain circumstances, in others they may not. Furthermore, Sobona comparing the circumstances of 1948 and the present notes:

"At no time does it appear that research of any kind was ever done to determine how many beasts a family requires for its existence, nor was a reliable census of the true numbers of animals being herded ever completed, a situation not dissimilar to that which exist today." (Sobana 1975:56)

What I am arguing is the need for improving our knowledge about the various obstacles hindering the control of stock rather than simply taking the "cattle complex" phenomenon for granted. Thus, the study has to start with illuminating the very problem of overstocking. There are many factors that may result in overstocking, for instance, a) the spread of diseases in part of the potential grazing area which implies the concentration of livestock only in the disease-free part b) the frequent occurrence of raidings also restricts movement of livestock to exploit all the potential pasture, c) the uneven distribution

* The "cattle complex" has a connotation which means the love of accumulation of stock for mere social prestige, see further chapter 8 - on livestock resources.

of water sources d) new government policies e) the growth of human population. Therefore, unless we have a clear understanding of the process which leads to overstocking, we would start with wrong assumption which definitely has a negative consequence for the socio-economic organization of the people concerned.

The areas surveyed, Chepareria and Kongolai have suffered from the same inherent problem of overstocking. In the late fifties, the vast majority of the Pokot inhabitants of the lowland were more or less dependent on pastoral nomadism (Schneider 1953) and their land was regarded as zones which had been devastated by overgrazing (M.O.A, 1950:136, 1962:155). Hence even in the scanty literature of this period, the major problem which had been accounted was: the stock population heavily exceeding grazing capacity. Widstrand's description may enlighten us further on the general opinion on this problem:

"Underdevelopment in a region like West Pokot was thus put down to the "cattle complex", the people are so peculiar that there must be some mechanism in their culture that makes them so peculiar; the abnormal love for cattle. Then the argument ran something like this; as they have too many cattle, and do not want to get rid of them, the government has introduced (repressive) measures to control cattle by compulsory destocking or by grazing schemes". (Widstrand 1973:38)

Even today, the most emphasized problem of the Pokot people in the various planning programmes is overstocking without raising the constraints which do not encourage the control of livestock and improvement of land resources.

ECO-CLIMATIC ZONE IV

It is obvious that a human geographer has a limited capacity to collect data directly from the field, on rangeland conditions and present a biological assessment of existing multivariant bio-organisms. So, I resorted to relying on the works of others. The authorities on this subject identified the project areas as belonging to eco-climatic zone IV (Cf. Gelens et al:1976 appendix 2). Such a classification permits me to crystalize all the environmental factors which affect the condition of pasture and livestock

e.g. the rainfall, soil, temperature and the topography in a nutshell.

An eco-climatic zone IV enjoys an average of 750-1000 mm. of rainfall. But, its distribution is extremely variable over the annual course e.g. 450-600 mm. from April to August. From October to March it has an average of 200-300 mm. But, the average falls rapidly to 100 mm. between the beginning of December and February indicating the peaks of the dry season. According to the same authorities, between April-September, October-March, and December-February, the rainfall exceeded nine out of ten seasons 300, 340, 70 mm. respectively (Gelens et al pp. 23) in the eco-climatic zone IV of West Pokot.

Its natural vegetation is identified as consisting of a mixture of dry forms of woodland e.g. *Acacia-Themeda* associated, *Balanites aegyptiaca* etc. and dry transitional combretum savanna. The land is also considered as land having marginal agricultural potential (Pratt and Gwynne 1977, Gelens et al).

One of the most interesting aspects of the study presented in Pratt and Gwynne is the analysis of the relationships between the bio-physical environment, livestock and human population. The analysis is based upon a number of assumptions. First, it suggests that these elements should be considered as interrelated parts so as to evaluate the surplus of livestock or human population in a given area. Secondly, it presumes that all land is accessible and productive, and finally, its human population is taken as being entirely dependent on milk and limited amount of meat consumption, while pursuing a sub-

Table 1.6. The relationships between the bio-physical environment, livestock and human population in eco-climatic zone IV.

No. of hectares required per livestock unit	4.0
Livestock unit required to support	3.5
Hectares required per head of human population	14.0
Maximum population density per sq.km.	7.0

Source: Pratt and Gwynne 1977 : 43.

sistence pastoral nomadic management system. Subsequently, the potential of an area within eco-climatic zone IV is estimated as indicated in table 1.6.

All in all, their assessment covers all the different elements which are significant to understanding deeply the concept "carrying capacity". For example, the frequently quoted Allan's definition stresses the same facts which are depicted in table 1.6. He notes:

"The carrying capacity of land for cattle and other grazing livestock depends on the average acreage of pasture land which is capable of maintaining an animal for an indefinite period without deterioration of the pasture and this in turn, depends mainly on soil and climate and partly on the system of management." (Allan W. 1965:191) my emphasis.

Nonetheless, the only drawback which is worth mentioning in Pratt and Gwynne's estimation is that the dynamic system of pastoral nomadic management is taken as if it is in a state of static conditions. For instance, even subsistence pastoral nomads, by investing more labour and by re-organizing the existing resources e.g. introduction of new type of stock, can produce more food and even can reduce the stress on the natural biotic-food energy which exists in their environment (Cf. Swift 1973:73)

For practical purposes, let us follow their suggestion, at least for a while, and begin to assess the project areas based on their estimated values as given in table 1.6 so as to establish the fact that the areas studied are overstocked assuming, as they did, a static management system.

In accordance with their estimation, each head of population needs 3.5 livestock units and each livestock unit requires 4 hectares, inferring 14 hectares per head of population. In other words, prime importance must be given in such circumstances to the access to a vast water-pasture land resource, so as to maintain the livestock units which provide adequate nutritional balanced food bases consisting of milk and meat for a given household. On the contrary, if the ratio (land to livestock) falls below the given limit, the human population will suffer accordingly. Its consequence, in general, may not be limited to reduction of population through increase in the death rate. Such natural control is effective after a substantial lapse of time, during which the potential of land resource as

a prime means of production of biotic food-webs may be reduced tremendously, leaving the area in question in an irreversible situation.

This means endangering even the future course of development in the same area. Therefore, in such an eco-climatic environment, both the human and livestock populations are extremely sensitive to bio-physical environmental changes.

As indicated in table 2.6, both Chepareria and Kongolai are overpopulated by both human and livestock populations in view of Pratt and Gwynne's estimation approach. Evidently, Chepareria is more overstocked than Kongolai.

Table 2.6. The relation between the potential biotic food-webs, livestock, and human population in Chepareria and Kongolai.

	Chepareria	Kongolai
Livestock Population (in S.U)	3806 *	3030
Human population	2311(146) *	1403(160)
Total area (in hect.)	9668	11323
The expected livestock population (Pratt & Gwynne)	2417	2831
The expected human population (Pratt & Gwynne)	691	809
The deviation of the actual livestock population	+1389	+199
The deviation of the actual human population	+1620	+594

* source : survey of 1979. N.B. The areas of the surveyed places are estimated by running a plannimeter frequently over maps of scale 1:75 000. All the figures in the bracket are the bound on the error of estimation at 95 per cent confidence level. Refer to appendix 1. to see how the stock unit is estimated .

In an actual sense, if we take into account the area occupied by the service centre of rural settlement of Chepareria, the reserved Naskuta holding ground, the gap will be further enlarged. In Kongolai as well, part of the

area which is taken up by the administration and service centre is counted as potential grazing area. Thus, if this is accounted for, the deviation from the expected livestock units would be undoubtedly greater than the indicated figures in the above table.

Traditionally, since the land resources were abundant, whenever the livestock units of a given household demands more potential land of biotic food-webs, it was made available simply by increasing the spatial movements of livestock. Thus, overstocking, human pressure and even drought, diseases and conflicts were neutralized by changing one's position from one location to another (Schneider 1953, Gulliver 1958). Hence, it is possible to say that a subsistence pastoral nomadism, in a strict sense, most likely had the possibility to provide a viable subsistence economic life for the people in question. But, today they do not have the same opportunity. Their socio-economic system is highly circumscribed by new constraints and movement of livestock in space is greatly restricted in relation to the past.

Therefore, overstocking should be accepted as a phenomenon which prevails in both areas. Of course this is presupposing the inhabitants to be pastoral nomads in a strict sense. In spite of this fact, the result is worthwhile noting because overstocking is realized while they are trying to establish a viable economic life with the subsequent growth of human population. This means to say that they are not in the process of amassing more livestock just for the sake of satisfying their abnormal love for cattle as often pointed out in many studies.

Furthermore, this argument concerning the growth of human population is supported by the density given earlier at the location level (see table 3.5). While Kipkomo (Chepareria) has 31 persons per sq/km. in 1979 with an increase of 14 persons per sq/km. between 1969 and 1979, Riwa (Kongolai) has a density of 20 persons per sq/km. in 1979 showing a growth of 7 per sq/km. during the 10 years.

In short, it should be clear that any planner who attempts to solve the problem of overstocking or even overgrazing, should not merely evaluate the reduction of stock numbers, without considering simultaneously other technical means of food production. This is necessary to satisfy the basic needs of the same people, or other strategies which relieve the areas from the existing burden of livestock and human population should be considered at the same time.

THE SIZE OF HOUSEHOLDS AND AVAILABLE STOCK UNITS

Up to now, although overstocking and pressure of human population were ascertained, the information gained does not go beyond the realization of the existence of surplus livestock and human population at the aggregate level. But it is believed here that it is worth noting, how the existing stock units are distributed among the households, and to what extent these existing stock units coincide with the size of stock unit which is necessary at least to satisfy the basic needs of each household. The answer to this may help us to give a hint of the problems which they face at present and the near future.

The graphic representation (fig. 1.6) provides an excellent illustration of the stock distribution, the gap between the stock units actually available and the stock units required by each size of household existing in the two areas in question. It is evident that only an insignificant number of households which can survive based only on livestock and livestock by-products. These households consist of 1-3 persons per households and they represent 5.8 and 13.1 per cent of the households in Chepareria and Kongolai.

In general, the illustration indicates that the gap between the stock units required and the actual stock units available increase more or less with the increase in the size of households. Relatively speaking, the discrepancy in Kongolai is not as large as in Chepareria especially for those households consisting of 4-9 persons. This may be an indirect indication which demonstrates that Kongolai is more pastoral nomadic in characteristic than Chepareria. Furthermore, if it is necessary, a simple method to estimate the percentage of the basic food needs of the households that can be acquired from the available livestock, is to draw perpendicular lines from the X axis to the line indicating perfect equality to the stock units needed for a subsistence economic life. In a sense, each length of this line represents 100 per cent of the requirement of a given household and each length of the part of the line from the X axis to the line indicating the actual accessible stock units of a given households, represents the percentage of the subsistence need that can be provided actually from the livestock rearing activity.

Subsequently, the households with ten persons in Chepareria and Kongolai, for example, can be said to have opportunities to acquire roughly 31, and 60 per cent

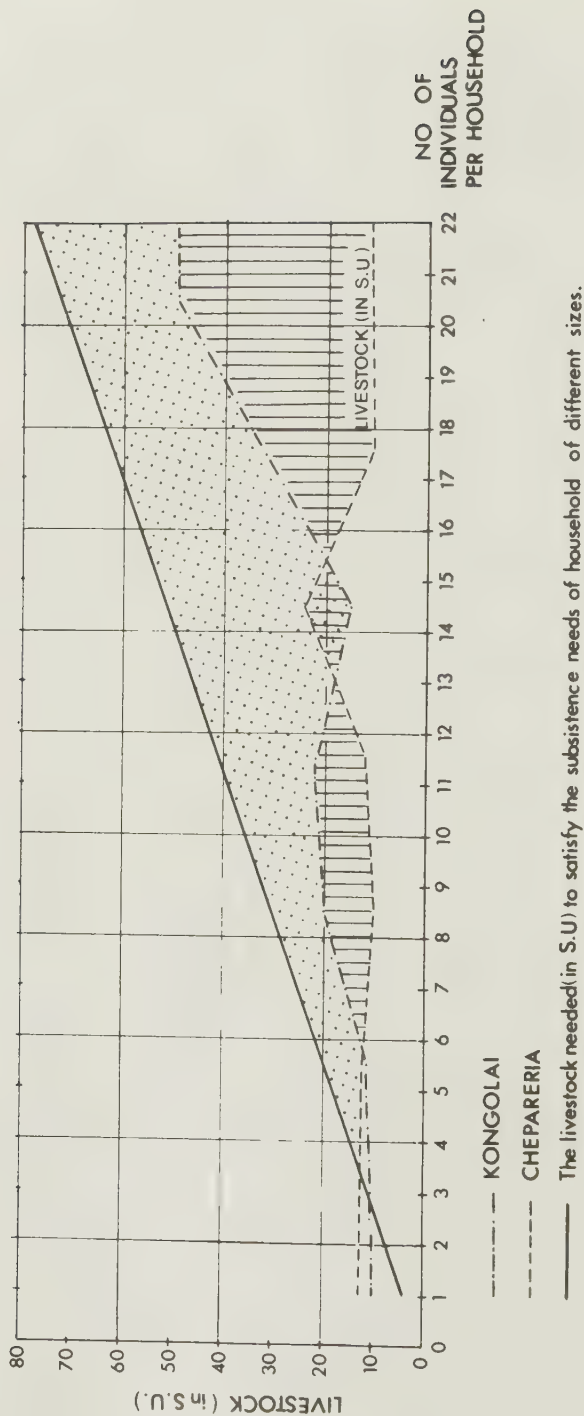


Fig. 1.6. This graphic illustration discerns the size of households and accessible stock units vis à vis the subsistence needs.

respectively of their subsistence needs, from their live-stock rearing engagements. The same procedure can be repeated for the other size of household.

In any case, it is apparent that the majority of the households are way behind the required livestock units in order to maintain the viability of their households. Recently, Livingstone, in one of the detailed reports of I.L.O on rural development, employment and incomes in Kenya, when raising the existing problems of marginal areas of Kenya discusses the same problem of Kongolai group ranch that is depicted here. Although, there are differences in approach and method of stock estimation and the whole Kongolai is covered depending on SRDP data, his conclusion fully supports my findings. He wrote:

"Thus, while there existed excess cattle...relative to carrying capacity, from the view point of subsistence requirement there was a deficit... quite apart from livestock required in order to secure cash income. In these circumstances requests to destock are likely to fall on deaf ears (Livingstone 1981:13:5)."

However, the author over-looked one aspect of this specific subject. He did not attempt to find out whether or not the same people have other additional alternative sources of food. He took for granted that they are pastoral nomads "stricto sensu" and concluded that the people concerned have no capacity to market part of their live-stock production to secure cash income. In effect, this may not be the truth. (This discussion will be continued in other section.)

At this moment, the plausible conclusions that can be made are, first the reduction of livestock cannot be accepted because it threatens their survival. Secondly, there are reasonable grounds which further encourages the increase of the existing livestock until they are checked by nature. Thirdly, it seems that the majority of the inhabitants have reached starvation level or they must have balanced the observed discrepancy through other alternatives.

THE CARRYING CAPACITY FROM A DYNAMIC PERSPECTIVE

So far, the analysis has been restricted to the production of the Pokot sub-societies in a space of an eco-climatic

zone IV with no expectation of improvement in the pastoral nomadic resources through additional new inputs and rearrangement of the existing resources as a system over time. Such an argument may be taken as reasonable at one point of time. For, production is determined by a given technical socio-ecological system of a given society at a given time. However, the assumption that the potential of pastoral nomadic resources is static and subsequently to state that it has reached its optimum level of production, is completely erroneous.

Many authorities agree on this issue. Let me cite one who has dealt well with the appraisals of the land value of pastoral nomadic people.

"Pastoral resources as used here are those objects of appraisal which affect, or thought to affect, the capacity of a given area of land to support pastoral production deriving its livelihood from that production. Because production at any one point in time is usually limited, the appraisal of the resources for that production also tends to be limited. That is to say the appraisal is in finite terms of areas, rainfalls, and vegetation, etc... Which appear to be relevant at the time. These finite terms are the available contemporary knowledge to be reflected in changing appraisal through time. Our examination of changing appraisals then becomes a review of knowledge of the environment as related to a particular activity within it." (Heathcote 1963:211)

Hence, if our appraisal should stress the environment vis à vis the prevailing activity within it, the determination of its carrying capacity prerequisites an analysis of the changing state of a given activities system. As was stated earlier an efficient system of herding and husbandry can increase the land carrying capacity for livestock and the livestock, in turn, the carrying capacity for human population.

In addition, most of the subsistence pastoral nomads have been practicing a primitive form of shifting cultivation once in a while for many years. Recently, with the increase in human population and scarcity of land, cultivation has been more and more associated with pastoral nomadic activities. This is because, it is universally accepted that a unit land yields far less calories from livestock than from crop cultivation (Grigg 1980:27). Brown also

commenting on the same issue notes:

"The cultivator, the primary user of vegetation, is at least three times as efficient at producing food as the pastoralist, the secondary user even under good conditions, and the gap is usually wider under primitive conditions. Consequently, it is no surprise to find that, where human population density rises, a pastoralist from choice tends to become an agriculturalist from necessity wherever the rainfall is sufficiently good to permit the change" (1971:94).

At this point, it can be argued that the adoption of cultivation in addition to pastoral nomadism will undoubtedly improve the carrying capacity for human population at least for some time. The output of food will increase, the stock carrying capacity may improve or maintain the original level or decline. It depends entirely on how it is integrated and how the resources are arranged and how it is enhanced by additional inputs in space and time.

All in all, with intensification of land use through mixing cultivation and pastoral nomadic activity, the demands for more input of labour increases markedly in relation to traditional land-use (Boserup 1965). Therefore, the land carrying capacity for human population or livestock should be revised continuously over time with the dynamic state of their activities system or with the degree of intensification.

In this view, the Kenya government as well has been appraising its arid and semi-arid regional spaces differently in the last two decades, particularly the zone classified as an eco-climatic zone IV (Kenyan Government: Five Years Development Plan, 1970-74, 1974-78). The state clearly indicates that it is possible to carve out small holdings for cultivation or agro-livestock activities. Which implies its acknowledgement that the potential of land resources has increased vis à vis its former natural optimum level of production. That is to say, the natural potential of land resources is considered to have been ameliorated over the years following the investment of additional inputs in form of organization, human resources, capital, improvement of water facilities, provision of new infrastructures, adoption of domesticated bio-organisms of higher yields and calories per land unit that can be used both by human and livestock population.

In contrast, Pratt and Gwynne's carrying capacity is

based only on the assessment of an unimproved natural land potential, recognizing the fact that it is in a static state to support stock and in turn the stock capability to support the human population, assuming a pastoral nomadic way of life. That is why, the use of the original carrying capacity becomes irrelevant when the man-made system is in a stage of advancement. The man-made system is an artificial construction which requires continuous economic inputs obtained from the total environment, its managers and as well as from exogenous institutions to maintain or improve its output level. Hence, in a true sense, the potentials of pastoral nomadic areas should be considered neither static nor exhausted, particularly if internal changes have occurred and external stimuli prevail. The analysis, then, should consider more the extent to which the natural potential has been realized rather than the extent to which those potentials have existed (Heathcote 1963). In other words, the understanding of the potentials of land resources of a pastoral nomadic society pre-requires a profound knowledge of how the activity is undertaken in a given area, the different investment of new inputs both by the individuals in question and outsiders e.g. the state, private entrepreneurs etc... and the consequences for the different parcels of land in the surroundings.

Such exploration will certainly not yield clear quantity units that can be a yard stick to indicate the extent of the pressure from the human or livestock population. Agricultural intensification is more difficult to determine. Nonetheless, we may still observe, for instance, a sign of intensification in land use e.g. the frequency with which a parcel of land is cultivated, that is, the crop-fallow cycle may show a new system of operations (Boserup 1965).

Even such an indicative factor should be seen with great caution because a crop-fallow cycle which indicates a low agricultural intensity under more marginal conditions, will undoubtedly point to a higher intensification attempt. The amount of increased labour necessary to raise the agricultural intensity, for example, at 1:4 crop-fallow cycle (twenty per cent intensification) under more marginal conditions may be compared to an attempt at raising the agricultural intensity at 1:0 Crop-fallow cycle (hundred per cent intensification) under the best agricultural conditions (Turner II et al 1977:392).

Hence, the understanding of human pressure should be

assessed based on multifarious factors as Grigg suggested rather than a mere argument based on crop-fallow cycle. He refers to them as symptoms of over-population (1976, 1980). Finally, the same approach will facilitate seeing whether there are new opportunities that simplify further the process of intensification or maintain the present situation within a positive course of development (see figure 1.2). On the contrary, if there is no sign of new opportunities, it can be concluded that production may decline gradually and destruction of the ecological environment may materialize. Obviously, this will leave the people in question between two inevitable options, starvation or out-migration (Brookfield 1972).

Furthermore, such an approach will clearly indicate to us that the pressure of human or livestock population can be solved not only by paying greater attention to one or two elements in the technical-ecological system e.g. the livestock versus the natural potential of land resources but, by assessing all the elements as an inter-related system that is affected by constraints and opportunities existing both within the system and outside the sphere of the system in consideration e.g. state policy, market condition, other economic infrastructures etc...

Conclusion

This chapter stressed at the beginning, the relevance of considering the wild biotic food-webs as scarce resources that should be given more or less the same approach as to cultivated crops. The main objective behind this idea is that it helps us to regard it as a resource which is allocated in different ways during the process of operations over time. In other words, the appraisals of the quantity and quality of this resource elucidates the fact that a biotic food-web in a unit land even under natural conditions has different potential resources which are closely interrelated to the management system.

The natural potential of the areas surveyed being considered in a static way indicated the prevalence of overstocking and human overpopulation. On the other hand, it became apparent that the herds of the majority of the households cannot maintain a viable subsistent economic life. Thus, overstocking is regarded as a subsequent effect of human overpopulation rather than the love for livestock. In addition, it can be assumed that the solution of the

problem of human pressure obviously will yield simultaneously the solution of overstocking. This is because overstocking is a problem which is entangled in the whole system of activities rather than in a specific element.

Subsequently, since it is evident from the field observation that the people have not reached the stage of starvation, it gave no alternative but to adopt a more dynamic analysis of the activity system to gain a profound knowledge of the same problem. It becomes necessary to see whether further investment of new inputs both in terms of changes in agricultural technique, pattern of labour allocation, type of livestock, organization etc... have been undertaken over recent years.

Therefore, in the coming chapter there will be an endeavour to show in a descriptive manner how pastoral nomadism has evolved into agro-pastoral nomadism in the areas studied.

7 THE EVOLUTION OF PASTORAL NOMADISM INTO AGROPASTORAL NOMADIC ECONOMY

INTRODUCTION

It was pointed out that the traditional Pokots, especially those who occupied the lowland, were more or less pastoral nomads and depended entirely on their livestock by moving continuously from one water-pasture station to another without identifying a fixed dwelling place. But, in the fifties the situation gradually changed due to new restrictions introduced by the colonial government. People began to identify themselves with a specific locality and some accepted the establishment of a fixed dwelling. In any case, the prevalence of different sorts of settlement systems was clear in the late fifties (Schneider 1953). An elderly informant, for example, commenting on Chepareria said that fixed dwellings were introduced between 1950-60. Whereas, in Kongolai it must be a relatively recent occurrence. But it is evident that the process has been accentuated after the introduction of a group ranch.

The highland where agriculture had its roots even earlier, had a small number of livestock and their movements were close to their settlement centres. On rare occasions, they covered a distance which is no more than 8-10 kms in radius from their dwelling places. Generally speaking, the households do not choose to move with their herds this far, if the condition of the pasture permits them to remain near their dwelling place. In contrast, in the lowland a spatial mobility with herds, of greater than 16 kms a day (one way) was not uncommon (ibid:194-95).

However, the introduction of strict administration rules which condemn raidings and other sorts of crimes, has facilitated the interaction between the highlanders and the lowlanders (mainly pastoral nomads). Consequently, the highlanders have increased their livestock both by encroaching on the domain of the lowlanders and gradually by establishing a peaceful co-existence with the pastoral nomads e.g. intermarrying so as to benefit from their specializations. To a certain extent, the trends may seem to indicate the expansion of pastoral nomadism. On this Schneider wrote:

"In the old days many people were afraid to go into the plains where they were more vulnerable to attack, so herding was inhibited by lack of freedom of movement. With peace there was no danger of attack to prevent a man from going into those areas to look for good grazing if he had a large number of cattle, sheep and goats. This does not mean, as Beech and others imply, that agriculturalists have deserted the hills for the plains, only that some stock owners who formerly lived in the mountains have descended to the plains to take advantage of the grazing afford there"(ibid).

Nevertheless, the improvement in interaction has most likely led to the introduction of farming techniques in the areas where traditionally pastoral nomadism predominated. Apart from this inevitable diffusion of innovation, non-Pokot peasant farmers began to move into the same areas. New marketing organizations and governmental rules of administration were introduced e.g. new land tenure policy, the traditional authority was replaced by modern institutions such as the Office of District Commissioner and District Officers etc... Obviously, the direct interaction and dependency between the highlanders and the lowlanders has been reduced tremendously. This is because, the new market organizations have bridged the two spheres, albeit not in totality. These changes in turn have modified both the human and livestock populations and their composition.

By and large, these people must have felt that they are neither in the same capacity to undertake livestock rearing as before, nor to sustain a viable economic life depending predominantly on pastoral nomadic activity. Which implies that the necessity of a reorganization of available resources and a creation of a new pattern and process of activities at the lowest socio-economic level, were inevitable responses. That is why, crop farming and other organizational innovations succeeded in being accepted with little resistance as a means of relieving the people from these established economic, social and ecological pressures.

With such developments, there is a knowledge worthy of credence gained from the various literature on pastoral nomadic societies, which stresses that the very nature of engaging in farming activities retains the family or group of families at certain location during the peak

season of farming, of course depending on the size of the available labour force and agricultural techniques. For instance, it was not uncommon traditionally to see a pastoral nomadic activity. However, even though those who were assigned as herdsmen were forced to return to their farms to give a hand with farming activities or to enjoy the fruits at the end of the harvest season, still they had the possibility to cover a long journey with their herds (see Rada-Dyson Hudson 1972). This was due to a low labour demanding cultivation practices and often to labour division by sex.

It is, therefore, rather interesting, to account further for the emerging behaviour of spatial mobility and these facts in turn may permit me to hint at the newly gained opportunities and constraints that led to the present circumstances.

SPATIAL MOBILITY

Today, the main factor which modified the behaviour of spatial mobility of people, are the various new tenure systems introduced recently. Subsequently, the majority of the Pokots in the areas studied are aware of the existence of such constraints.

In view of these facts, the behaviour of spatial mobility of the population and livestock can be described from the standpoint of three different land tenures prevailing in the areas studied. As suggested in table 1.7, the major part of Chepareria falls under private land tenure*, and a small part is still under "trust land" tenure. Kongolai, on the other hand is entirely under group ranch tenure.

What it means is that each type of tenureship has different effects on the spatial mobility behaviour of the people in question. For instance, in Chepareria within the privately owned area, everyone is fully aware that the new law gives prerogative to a specific headman of a household to use a given plot of land in whatever way he or she wishes. Thus the outsiders cannot ignore this land law unless they have in advance consulted and come to terms with a given owner. Actually, such opportunity

* Land that has been held in trust as "trust Lands" by the County Council of West Pokot District.

Table 1.7. Types of tenure systems in the two areas surveyed in per cent of households.

type of tenure	Chepareria (in%)	Kongolai (in%)
Private	69.6	-
Landless	9.8	-
Trust land	20.6	-
Group ranch	-	100
Total	100.0	100

Source: The field survey of 1979.

is not open to everyone and at all times. Everyone raises livestock and treasures both their arable land and under natural pasture. So it leaves them one option, that is the limited public land which exists between the adjudicated private lands and in certain cases, the gazetted forest land.

Nevertheless, the existence of "trust land" in the neighbourhood allows some of the livestock owners on the private land to encroach on it whenever they are threatened by scarcity of pasture, particularly if they have a relative within the trust land. But such strategy undoubtedly requires more active herding due to lack of security and the long distance from the location of their dwellings. In other words, it drains more labour from the crop farming and other activities. Hence, they resort to such strategy only after exhausting the other possible sources of pasture.

Based on interviews with the local people during the whole of 1979, it appeared that the majority of the people of Chepareria are confined to natural pasture on their lands and public land close to the location of their farms (or dwellings).

The approximate distance given by the local Pokots of Chepareria helps us to discern that the task of herding is undertaken within a distance of less than one kilometer by more than 90 per cent of the inhabitants during the farming season. In other words, it indicates the strong dependence of the inhabitants of Chepareria on natural

pasture which prevails close to their farms. Implicitly, it elucidates that traditional pastoral nomadism is substituted by relatively intensified activities which combine both livestock rearing and crop farming.

Table 2.7. The herds' movements during the cultivation period in Chepareria .

Distance	Households frequency (in %)	Cum. frequency (in %)
Less than 0.5 km.	17.2	17.2
0.5 but less than 1 km.	75.3	92.5
1 km. but less than 1.5 km.	5.4	97.8
1.5 km. but less than 2 km.	2.2	100.0

N.B. The table includes the households which are within the trust land , then most likely the 7.6 per cent of the households which cover above 1 km. from their dwelling places, are those who have very little restriction of spatial mobility. The distance covered could be within their own farm, other farms, public land, in the trust land or in combination.

Consequently, a new settlement pattern seems to have emerged. Figure 1.7 shows that the area which is close to the main communication lines, particularly the central part, that is, north to the Kapenguria-Orthum roads, gives an impression of a greater concentration of dwellings. In the same area intensive cultivation is practised and the land is held privately. On the other hand, a well dispersed settlement has emerged in the western part where the land is eroded and consists of rocky-slopes. The concentration of settlement follows as well the perennial and seasonal river distribution in the geographical space of Chepareria. These patterns of settlement are closer to a typical rural agricultural society than to a typical pastoral nomadic settlement which is often patterned as clusters of groups of households having the shape of well dispersed isolated islands. Between such clustered homesteads, a distance of more than two kilometers is not uncommon. The map of Kongolai (fig. 3.7) will confirm

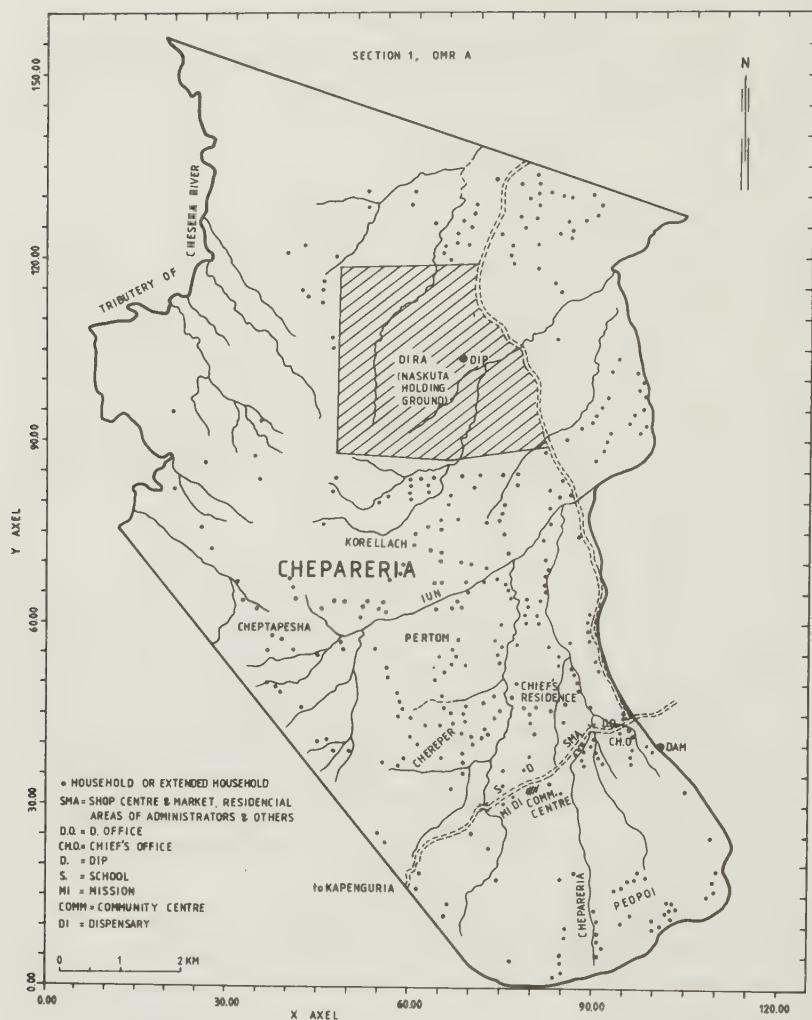


Fig.1.7. The settlement pattern of Chepareria and the various facilities accessible at its service centre.

this type of settlement. In Kongolai, each clustered homestead is referred as "Manyatta".

Thus, the main question in the case of Chepareria is, do they have livestock rearing interlocked with crop farming without negatively affecting each other? Have they succeeded in producing sufficient of the basic food which is necessary for their households? Is the intensification which has begun in Chepareria a sign for further agricultural development or impoverishment?

In contrast, the people of Kongolai are facing a completely different nature of problems inherited from the system of its newly adopted land tenure. The pastoral nomads of Kongolai have access to a large grazing area which consists approximately of 11323 hectares (or 113.23 sq/km.), that is, all the members own it as a group collectively and the task of management is carried out by a "group ranch committee" in close cooperation with different governmental offices e.g. The range management division, agricultural division etc... In short, all members have the right to utilize the water-pasture resources within the group ranch. Thus, a variable spatial mobility with herds could be adopted in accordance with the internal arrangement established by the group ranch committee.

The adjudication and registration of group ranches was introduced in the late sixties in Kenya in order to induce the change of the marginal tribal land which was traditionally common property to private property without incurring social constraints of great magnitude, and without creating landless individuals. But, at the same time, the intention was not to deviate much from the principle of private ownership adopted in the other part of Kenya, with the belief that it creates new incentives to individual farmers or herders for further development. As a result, it has been welcomed by pastoral nomads as a vehicle which guarantees their land rights and provides better security (Davies 1971, Hedlund 1971, Halderman 1972, Simpson 1973, Emmanuel 1975, Livingstone 1976, Doherty 1979).

Nonetheless, there is a common misconception about the group ranch among officials associated with its implementation programme. Usually, they emphasize the closeness of the group ranch to the traditional socio-economic organization. Subsequently, it is assumed that it is an excellent stepping-stone to initiate modernization of traditional livestock rearing activities. At the same time, there is also the conviction that it will preserve many of the features of the old traditional way of life and also avoid social conflicts. While one cannot deny its use as a stepping-stone for further changes, one may cavil at the credentials of the remaining statement. For, it gives the wrong impression that the implementation programme is an easy task.

The group ranch as a socio-economic organization is not simply a question of issuing a legal title to a given group of individuals in order that they undertake their livestock rearing activities within a defined area of

land. Actually, the organization of the group ranch pre-requires a higher know-how and a new technical system so as to make it a successful project. Even the land legislative (Group Representative Act of 1968) notes this fact in addition to the land adjudication and title deed issues, by pointing out the need "to organize a framework for administration of the use of land so adjudicated (Okoth-Ogendo 1976:167). Simpson's definition of a group ranch can elucidate more clearly this fact:

"Group ranches are production enterprises in which a group of people, jointly have title to land, collectively maintain, agree on stocking levels, markets the surplus, in rotation herd their livestock collectively; yet continue to own livestock as individuals" (Simpson 1973:12)

Therefore, the technical socio-ecological system introduced as a result of the new organization would undoubtedly entail an intensified system of grazing vis à vis the traditional system of grazing. This is to say, the new system of herding would undoubtedly demand a greater investment of human-time (or labour) because although the distance that will be covered with herd, will be minimized, a group ranch requires a wider knowledge of husbandry and a strict pattern and process of grazing throughout the year. All in all, a greater appreciation of all resources and their use at the right time and by an acceptable number of livestock, is of paramount importance. Hence, the aim of the introduction of a group ranch as a tenure innovation in Kongolai is a means of addressing the following issues:

1. To introduce a better technique of grazing by forming paddlocks or grazing blocks and a new system of rotation. This technique hopes to permit conservation and allow regeneration of grass.
2. To control the spread of contagious diseases.
3. To improve the quality of domestic animals.
4. To introduce destocking measures so as to balance the number of stock with the carrying capacity of bio-ecological resources over time.
5. To improve livestock marketing.
6. To prevent movement of cattle between group ranches.
7. To guarantee rights and security of access to land resources to all members.

8. To provide for the people concerned new facilities which enhance the new organization e.g. source of water, dips, veterinary services, health services, better residential areas, better system of administration, loans etc...

(S.R.D.P/OP 12 :1975, Livingstone 1978, 1981)

Therefore, the spatial mobility should be planned and implemented in a certain pattern so as to bring about change in the management of water-pasture resources, simultaneously with the adjudication and registration of land.

According to the objectives, the group ranch in Kongolai is sub-divided into four blocks as indicated in the graphic representation (figure 2.7) in order to be used for grazing in rotation system at different times of the year.

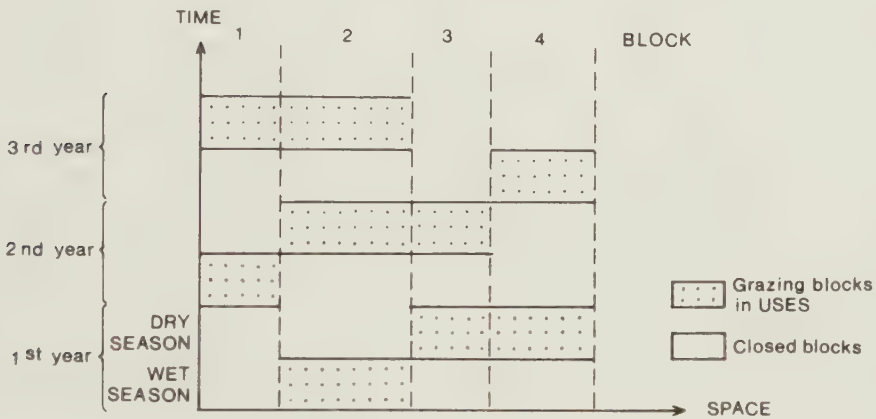


Fig.2.7. The system of rotation in four grazing blocks-(source : The Office of Range Management, West Pokot district). Thus, through the above pattern and process of herding activity, it was believed that a) at least one block will be made to rest and recover its biotic food-webs during a whole year, b) each block is intended to be grazed at a different season in every subsequent year, c) such pattern of rotation, in turn, is assumed to permit treatments, such as burning or application of chemicals for bush control in each block, d) it is also accepted that it is possible to adjust the sequences whenever the season condition calls for such action.(use this graphic illustration associated with fig.3.7. which illuminates the condition of bio-physical resources, access to water sources, dips etc...). For further discussion on the intended grazing blocks and management system see also S.R.D.P/OP 12 1975 Chapter 10 pp.7-19.

In other words, it was evident that the intention was to establish a somewhat intensive livestock ranch relative to the past situation. Undoubtedly, the implementation of these set of operations, would have at least created a new system of settlement which is properly adjusted to the pattern and process of their activity.

Some researchers who undertook their studies just after the introduction of the group ranch in Kenya, voiced their pessimism about the project, stressing the fact that the proposed group ranch does not consist of their customary wet and dry season grazing grounds (Halderman 1972:8, Widstrand 1972:5). Firstly, their assertions that the traditional pastoral nomads had access to multivariant bio-ecological environments is undisputable. Secondly, their criticism is also tenable if the plan of the group ranch is viewed in the same way as the grazing schemes introduced in the early fifties during the colonial period e.g. West Pokot grazing schemes - Riwa (York 1967) and the allocated tribal grazing lands in different part of East Africa e.g. in the Karamajong's land of Uganda (Baker 1975, 1977,). This is because the grazing schemes or the allocated grazing lands were more or less an attempt to conserve the natural vegetation and to control erosion. Alternatively, its objectives were to control the inhabitants more effectively by reducing conflicts and raidings which were prevailing between tribes and in certain cases to extract cheap livestock resources. Whether it had in reality the objective also to bring about socio-economic development in the marginal land of East Africa is highly questionable (Fumagalli 1978, Quan 1978, Sobania 1979).

On the other hand, the recent Kongolai group ranch formation is intended to be based on a package-deal project, that is, the loss of a part of a traditional bio-ecological environment, as noted above by some researchers, is intended to be compensated by new inputs. That is to say, the quick vacillating nature of all resources within the pastoral nomadic socio-ecological environments which require spatial diversity with different biotic food-webs so as to maintain their viability, is planned within a smaller area. That is some of the resources which were made available by traversing in time and space in diversified ecological niches of biotic food-webs, are intended to be made available within a smaller area by creating man-made resources of longer durability. Among these are dams and boreholes, an introduction of a better system of land-uses which enhances both the conservation and

regeneration of biotic food-webs for livestock, infrastructure and incentives which stimulate both the organization of resources and operations. In short, a group ranch was intended to promote a qualitative higher reorganization and the usage of available resources as an

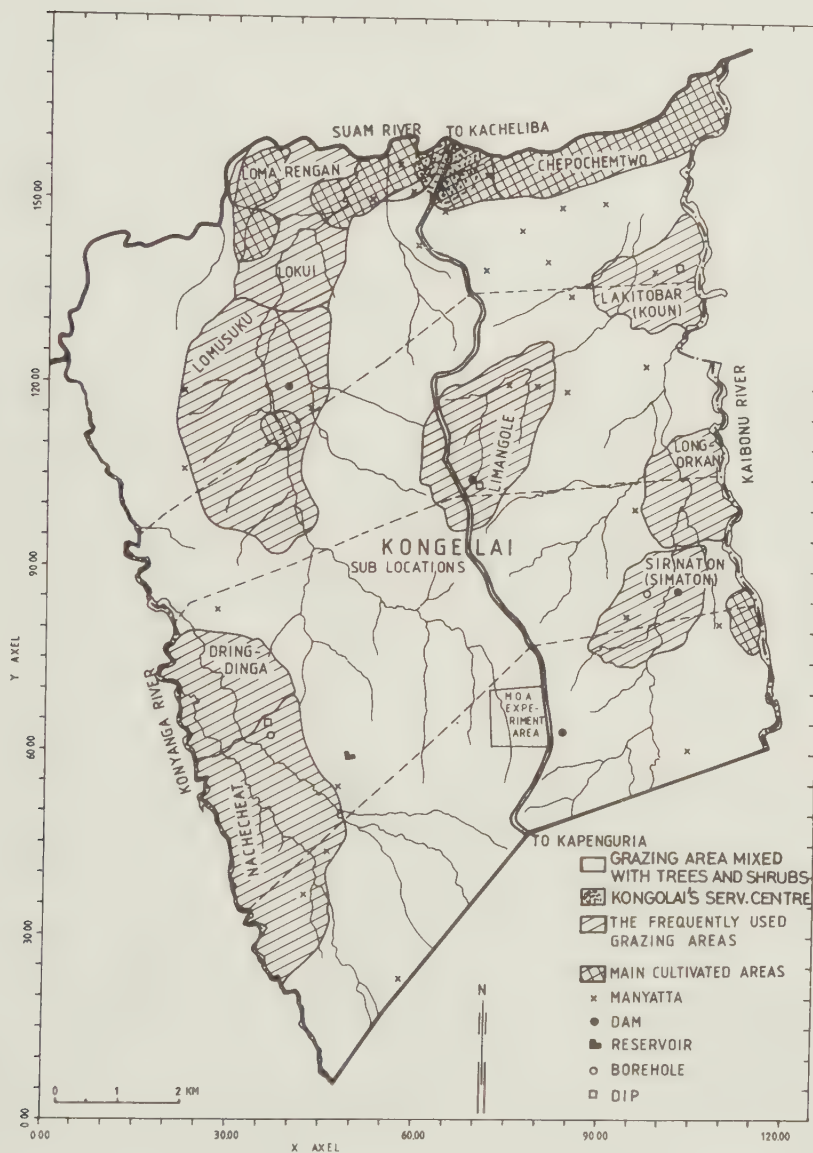


Fig.3.7. The settlement pattern, the high potential grazing land and other infrastructure in Kongolai.

entity system. Besides, it was also regarded as a land-saving device whereby the inevitability of reducing grazing land is declared in advance.

Therefore, the essence of a group ranch patently is an excellent plan for promoting development within the people concerned. If the group ranch of Kongolai is not functioning as it was intended, it must be due to a lack of commitment towards fulfilling the planned package-deal project rather than the conceived plan.

Let us see how the plan is implemented. After the demarcation of the ranch, it was sub-divided into four blocks and through clearing the bush and trees (see fig. 3.7), the blocks were made visible on the physical ground. Furthermore the blocks were established considering accessibility to at least one water-source e.g. natural river or man-made water-sources e.g. dams or boreholes and finally dip.

Nonetheless, the system of rotation which was implemented in 1979, was far from the planned pattern and process of herding (see fig. 4.7). According to the opinion of the officials concerned, the system in practice is not an ideal one. But, it was designed as a feasible transitional method aimed at having the members conveniently adopting better methods gradually over time instead of having them change suddenly to a completely new system.

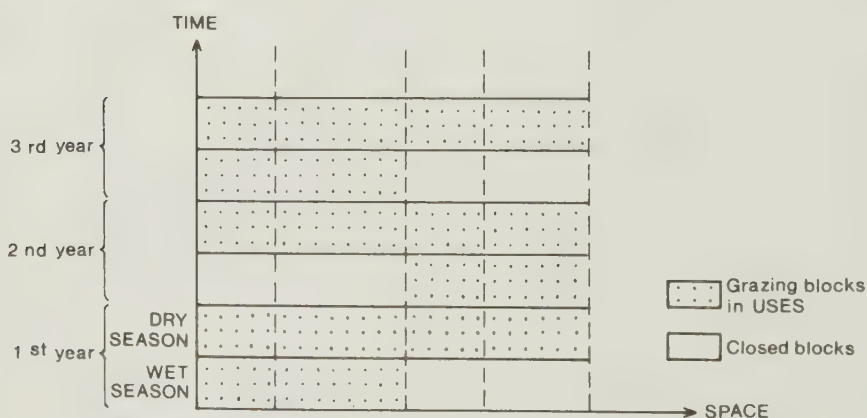


Fig.4.7. Herding pattern and grazing blocks from 1977-79 (source: The Office of Range Management, W.Pokot district).

Actually, even the modified system of herding as discerned in the above representation cannot be said to be properly adopted. Put in another way: though the grazing area of the ranch was sub-divided and allocated for herding both in space and time, it has not been grasped that the success of the group ranch is entirely dependent on the package-deal project, that is, the cardinal importance of a highly disciplined technique of operations through hard work, more careful utilization of water-pasture resources, the demonstration of their prerogative over the given ranch so that others endorse their authority on their domain, and the creation of economic infrastructures and organizations which create incentives to strengthen the new technical socio-ecological system, are elements of the group ranch which are hard to find today in Kongolai.

It will be fruitful to illustrate the circumstances of the Kongolai group ranch by quoting the warnings of the two well-known researchers in this field in Kenya.

"If group ranch boundaries are not regarded as sacrosanct in terms of grazing rights by herders the entire logic of group ranch grazing management is undermined". (Hopcraft 1980:17)

"The ultimate viability of each group ranch as a self contained unit requires the successful implementation of an effective rotation grazing system." (Halderman 1972:2)

As a result of a partial implementation of the planned programme of group ranch organization in Kongolai, the pattern and process of their spatial mobility and their activities which have been observed in the field is neither close to the one conceived in the plan nor to the traditional one.

The different trends of evolution from the spatial mobility point of view are hinted at in the section about the Chepareria and Kongolai sub-regions. But to understand its effects in depth, that is both the positive and negative ones, it would be necessary to assess further the socio-economic conditions of the people at micro-level, which in turn directs our attention first to investigate resources associated with their activities e.g. human, livestock and cultivated land resources.

8 FARM RESOURCES AS ELEMENTS OF THE ACTIVITIES SYSTEM

INTRODUCTION

Those inputs or attributes in farm organization and operation which are sources of variation within a given regional or sub-regional space, can be defined as farm resources e.g. human-labour (human-time), livestock, crop or grazing land, tools, capital (cash) etc... The measurement of their distribution within the population is a sine qua non prerequisite as a basis for understanding the process of development or formulation of a new policy of planning programmes.

But, in rural African societies, the most relevant resources that are causes of inequality are the human-labour, livestock and land resources. Consequently, I will pay more attention to those three main attributes or resources of farms in the discussion in this chapter. The others involved will be taken up in the course of issues that will be raised in the coming chapters.

HUMAN RESOURCES

The term human resource or manpower can be defined as the total energy, skills and knowledge accessible in a given country, region, sub-region or even in households farm at a specific time. The energy, skills and knowledge are determined not merely by the number of human being involved but also by their qualities or characteristics (Trewartha 1969).

Various studies on characteristics of human resources indicate that there are many ways of assessing them systematically. One of them is as follows: the biological factors (age, sex ratio, natural increase etc...) the cultural factors (beliefs, aspirations, division of labour by sex or age group, education, marital status etc...) and the economic factors (size of farm, tenure status, size of livestock etc...). Jonsson refers to the latter as the situational factors, which is actually a more appropriate definition (1975:92).

Although all these factors stated are believed to have

some kind of implication for human resources, I am interested in discussing those aspects which are directly related to the organization of the economic activities of the people in question. Thus, values and attitudes are anticipated as being reflected from the activities undertaken. In addition, some general and detailed information on cultural and situational factors is already discussed in the three preceding chapters.

At this stage, perhaps it is fruitful to analyze the potential human resources of the two surveyed sub-regional units in a narrow quantitative sense which is usually referred to as population.

The population of the Project Areas

The population of the project areas is estimated at 2311 (146) and 1403 (160) for Chepareria and Kongolai respectively. Virtually, all those represented in the estimation are Pokot by origin. The study has not taken into consideration those households in the two rural centres of the areas in consideration which do not cultivate land or raise livestock e.g. households of the workers of the Ministry of Work living in a barrack in Kongolai's centre, households of the administrators, teachers etc... because these households are not part of the permanent resident population of the two areas studied.

The population composition

The most common customary influence on labour allocation and its availability on a specific farm is the specialization in functions by sex or by age group. For instance, a certain portion of an operation or an entire operation may be the duty of a specific sex or age group. In such circumstances, the absolute quantity of labour available in a given socio-economic unit is not the sole determinant factor, functional rigidities could be also a constraint which may not fully allow the exploitation of all accessible human resources. But this does not mean that such customary influences prevail in all rural societies. It may be, for example, very difficult to visualize the division of labour by sex in a strict sense, at peak periods in the season. Anyway, it may be useful to assess the population composition from the aspects of sex ratio and

age group.

The sex ratio in the population, that is, the number of males per 100 females is found to be highly unbalanced in Chepareria at 112 and slightly lower in Kongolai at 96. The national Kenyan figure is 99. The Kenyan population census of 1979 also gives 101 for Chepareria sub-location and 97.2 for Kongolai sub-location (ibid pp.121). Although these figures do not coincide with the highly unbalanced ratio of the surveyed part of Chepareria, at least it indicates the dominance of males suggested in my findings.

Many reasons can be given to clarify this unbalanced relationship. But, one of the most likely explanations could be the in and out-migration of married girls and women from or to these specific areas. For, wife or wives in Pokot society are usually obtained from a distant community. This is mainly due to the fact that the Pokot are divided into a large number of totemic exogamous patrilineal clans (Brown 1977) and in practice the rule of exogamy is enforced not only up to the level of clanship but beyond the bond of kinship. For example, a man cannot look for a wife from the clan from which his sister has married, nor a girl from the clan of his brother's wife, nor into the clan of any of his wives (Cf. Schneider 1953). In other words, the structure of female population above 15 years of age is not only determined by the conditions of the natural population growth, but as well by the gain or loss of female population as a result of in and out-migration of married females to or from a specific area.

I am certain, for instance, that the low sex ratio of Kongolai is at least partly affected by the circumstances of the marital status of the headmen of households which own a large herd. It is not uncommon to encounter a headmen married to three wives.

In general, it seems that those households which tend to be more pastoral nomadic in characteristics are associated more frequently with polygamous practises than those which are more settled and pursue intensive crop farming activities. However, it is still difficult to be certain whether the Chepareria sex ratio unbalance is affected adversely outweighed by out-migration of females or other factors. For, there are no reliable statistics on migration.

As indicated earlier, the data collected on the age of individuals are questionable. In light of this fact, I was very cautious while assessing the age structure.

Thus, I believe a simple division of the population into the common standard age-groups as given in the following table is more informative than attempting to discuss the detailed age structure.

Table 1.8. Population in different age-groups in percentage for Chepareria and Kongolai in comparison with the situation at district and national level.

	Young under 15.	Young under 8.	Adult (15-64)	Working aged group	Aged over 64.	Young and aged	Young & aged Adult
Chepareria*	45.7	23.3	53.0	75.4	1.3	46.9	88.6
Kongolai*	40.3	21.4	58.3	77.2	1.4	41.7	71.6
W.Pokot**	47.6		49.5		2.7	50.3	101.6
Kenya(national)	48.4		48.3		3.2	51.6	106

Source: * The field survey of 1979

** Kenya population census of 1979.

My findings are close to the figures of W. Pokot at district level except the age-group 65 and over. Most likely, some of the individuals enumerated in the age-group 15-64 may have understated their ages, which may have resulted in a too low percentage in the oldest group. Such an error is not uncommon among people composed of mainly illiterate individuals. All in all, the table presents a typical case of an underdeveloped country's population composition e.g. the indices of dependency ratio indicates heavy burdens of non-productive age on the labour or active human resources of the two areas studied.

The actual active human resources

Nowadays, like other parts of Kenya, the family is both a consuming and producing unit. In other words, the family's labour, skill and knowledge are the means by which agricultural products are acquired for family consumption and sale.

In the major part of Kenya, there is also a clear indi-

cation that women undertake the major portion of the farm work in addition to their usual domestic tasks such as food preparation, child rearing etc... This has been justified by cultural factors or by the fact that males are the most preferable labour force employed in off-farm activities to acquire additional income.

However, the demand for males in off-farm activities both in Chepareria and Kongolai is not at all significant. On the other hand, the cultural practice of division of labour by sex has played a prominent role in allocation of labour between crop and livestock farming traditionally and does so even now in major parts of West Pokot district where the land tenure system is still under communal ownership. But as the level of technology adopted shifts to more and more intensive labour activities due to population growth and introduction of new rules of tenure, the family's labour input is forced to consist of both sexes irrespective of the traditional principle of allocation of labour between males and females. At certain periods of the year, the various farm activities may have even to be supplemented by hired labour. There is, for example, little distinction between the sexes as far as farm labour is concerned with the exception of ox-ploughing in the privately owned zone of Chepareria.

Conventionally, the age-group 15-64 is considered as the active human resource in developed countries. In view of this group, the surveyed areas have a little more than 50 per cent as indicated in the above table. But, the acceptance of this classification method would obviously lead to underestimation of the population which actually invests its labour (human-time). This is because the incidence of children from 8 years of age onwards who participate in various activities, especially in herding, is quite significant in the marginal areas of West Pokot.

Therefore, the consideration of the age-group 8-64 as suggested above, is more appropriate than to follow the conventional grouping referred as working age. Accordingly, roughly 70 per cent of the population participates in economic production in the areas studied.

On the aspects of labour availability at household level, it can be said as suggested in figure 1.8 that the majority of households in Chepareria are in a better position relatively speaking than those in Kongolai. For instance, while households of 3-6 individuals aged 8-64 is highly significant in Chepareria, small households predominate in Kongolai. In any case, it seems the distri-

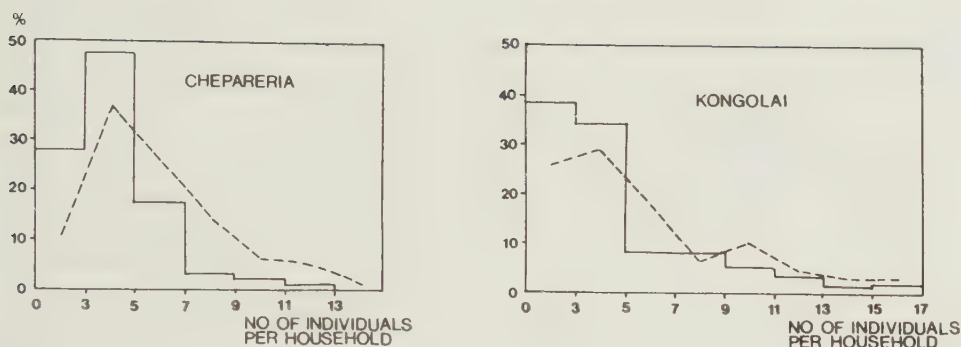


Fig.1.8. denotes the distribution of active human resources in Chepareria and Kongolai. The solid line indicates the number of individuals 15-64 years of age per household and the broken line 8-64.

bution of labour force in Kongolai is highly skewed with a high concentration of household with a small labour force at one end and roughly 20 per cent of the households with abundant labour force (above 8 individuals) at the other extreme end.

Since the group ranch of Kongolai is a recently established organization (1972) we should expect registration of many young family units to exploit the opportunities which were made available by the introduction of the group ranch. In contrast, the households of Chepareria are part of a settlement which has grown slowly over time. Most of the farms, for instance, in the privately owned areas have emerged before the adjudication and registration of land as a unit.

As a whole, accessibility to sufficient human resource for a given household undoubtedly means not only the possibility to rear livestock and cultivate crops, but also the existence of options to improve land resources, to undertake a higher quality of husbandry, to allocate labour to non-agricultural activities whenever it is possible. In view of this fact, Chepareria is endowed with better human resources than Kongolai.

LIVESTOCK RESOURCES

The contemporary Kenyan government places a very high priority on the development of livestock production.

Indeed, a tremendous effort has been made to tackle the multitudinous problems by further capital investments in new technologies and infrastructures, manpower training etc... In spite of this fact, many experts in this field have questioned critically the way in which these means of development are implemented. In any case, Kenya in relation to other East African countries has already made tremendous progress in various aspects of livestock industry. As a result, especially its success concerning exotic cattle for both dairy and beef production is outstanding. However, since the indigenous zebu cattle and small stock are the predominant ones, they will be the cardinal issue for this study.

The major part of Kenya, that is approximately 80 per cent, is classified as arid and semi-arid pasture land and is considered as unsuitable for intensive farming and livestock production. Of course, the appraisal is entirely based on the natural endowment. Consequently, it provides a home for 2.5 million people (M.o.C.D 1980:12), that is, 16 to 17 per cent of the Kenya's population are engaged in activities which vary from pastoral nomadism "stricto sensus" to intensive agro-livestock farming. For example, the Nandi, Kipsigis, and part of the Borans, etc... are some of those who are in the processes of intensifying their activities (Brown 1971:94).

Kenya has roughly 9.5 million national indigenous zebu cattle and the arid and semi-arid land (ASAL) contribution is 60 per cent of this herd (FAO/EMASAR II 1977c:20) which is approx. a little more than 5 million cattle. The sheep and goat population is estimated to be close to the size of cattle population (M.o.A/M.S.A 1978:2). West Pokot district as a part of ASAL, alone contributes roughly 3.6 per cent of the cattle and 7.3 per cent of the sheep and goats of the arid and semi-arid land*.

The report of the Ministry of Agriculture, Livestock and Range management Division indicating the value of livestock resources on the national market wrote:

"Livestock and livestock products represent about 30 per cent of the gross marketed agriculture production and it is growing at about 9 per cent per year.

*The Ministry of Agriculture 1978, West Pokot District Annual Report gives 180 000 zebu cattle, 3523 improved dairy cattle, 83326 sheep and 280 500 goats (pp.4)

In 1974 this amounted to K£ 32.0 million. The 1976 figure is estimated to be nearly 38.0 million. Even more important than this, is the sector's contribution to the non-monetary economy in the form of meat, milk, hides and skins. In 1976 the livestock sector contributed substantially to employment and foreign exchange earnings with export sales of nearly K£ 18 million (Cf. M.o.A/M.S.L.P.I Report no.8 1978:2).

Its importance in the national economy has not changed much since 1976. The value of gross marketed production increased from K£ 37.1 in 1976 to 62.1 million in 1978 but declined slightly to K£ 54.7 million in 1979. It is estimated to decline further to 53.6 million by 1980, making generally, livestock and livestock products the third biggest currency earner (Cf. Kenyan Statistic Abstract 1980:99).

In other words, it is not difficult to see the importance of livestock and its products, specially for a country like Kenya with a population growth of 3.4 per cent annually (Cf. Economic survey:1980). This is because the trends in the population growth suggest undisputedly the existence of a lucrative national market for beef.

The beef consumption per capita was around 11.2 kg in 1970 and it is estimated to grow by 18.1 per cent in a decade and the consumption per capita by 1985 will be 14.7 kg as seen in table 2.8.

The implication, therefore, is clearly that a constant increment of livestock and livestock products in the coming years is definitely required. Any sign of discontinuity in these required trends, clearly means a stagnating livestock industry which entails a fall in the protein intake of the Kenyan people unless meat is imported. It also indicates the abandonment of a promising export industry, if the decision is taken to divert supplies of livestock and its by-products to the home market. It was pointed out, for instance, that 90 per cent of the total livestock production was absorbed by the domestic market in 1969 (Cf. Simpson 1973:1) and out of 126 million kilograms of beef production in 1970, roughly 9 per cent or 11.2 metric tons were exported (Working Party Report:1971).

The need for improving livestock production is well recognized by the Kenyan government. Concerned by this fact, the Ministry of Agriculture requested the formation of a "Working Party on Livestock and Meat" to evaluate the conditions and to formulate the plan for the deve-

Table 2.8. Estimate beef consumption for the agricultural and non-agricultural sectors 1970-1980 .

Year	Total beef consumption (metric tons)			Per capita consumption (kilograms)		
	Agric. sector (1)	non-agric. sector (2)	Both sectors (3)	Agric. sector (4)	non-agric sector (5)	Both sectors (6)
1970	76500	49200	125700	8.24	25.0	11.25
1975	88664	71697	160361	8.24	28.98	12.12
1980	102740	104059	206799	8.24	33.60	13.29
1985	119111	150464	269575	8.24	38.95	14.73

Source: FAO 1972 .

*In this table, it is assumed that urban(non-agricultural) beef consumption per capita income will increase at a compound rate of 2.5 per cent per year, with income elasticity of demand of 1.2. Column 2 is obtained by multiplying column 5 by non-agricultural populations which are from 1970 to 1985, 1968000, 2474000, 3097000 and 3863000 & column 1 by subtracting from column 3 column 2. The total agricultural sector beef consumption varies directly with the change of population . In essence, this means that per capita agricultural sector beef consumption is constant (ibid pp.29).

lopment of the production of this resource in 1970. Their report, which came out in 1971, anticipated a fairly optimist achievement forecasting a flourishing livestock industry in the near future.

Its development programme envisages increasing the number of cattle and the carcass weight. Furthermore, it aims to encourage the production of sheep and goats so as to reduce the beef consumption on the domestic market. The same report ascertains that there is no problem in relation to the demands for Kenya beef on the international market. Nonetheless, there are many experts who have substantial knowledge of Kenyan livestock agricultural production who do not share the opinion of the "Working Party on Livestock and Meat". On the contrary, they see the future situation in a dim perspective (FAO:1972,

Simpson:1973). Actually, the report of FAO's experts ascertains that it is more likely that the previous Kenyan beef surplus will disappear by 1980 or 1985 (ibid pp.31) and it seems that their judgement is correct because the gross marketed production of livestock and livestock products has already began to decline as mentioned earlier.

In short, there is no doubt that there are numerous problems to be tackled. The prevalence of contagious diseases, overgrazing, meat and cattle price control which restricts the production, the outdated and inadequate KMC's facilities, the inappropriate location of the processing facilities vis à vis the supply areas, which entails an increase in market costs and weight losses from a long distance travel etc. are a few of the many problems that can be mentioned (ibid 1972). However, the main causes for the slow development of livestock production which are echoed both in governmental and private researchers' reports, is ascribed at the national level to the predominance of the conservative attitude of the inhabitants of the marginal areas, that is, the phenomenon of "cattle complex" or the attitude of contra-monetary value. It seems the multivarious socio-economic conditions which prevail in the range or marginal lands and which call for a multivariant strategy of development programme are not yet recognized. Recently, the Ministry of Cooperative with the objective to promote a) development of human resource b) exploitation of land productive potential c) resource conservation d) integration with the national economy, within ASAL has created five geographical contiguous blocks of districts as bases for collecting data and finally, to formulate development programme (Cf.M.o.Co. Report no. 5:1980). I do not deny that it is a step forward in the study of marginal areas. Still I suggest that the only fruitful results that can be gained, is through-collecting detailed data and exploring them in depth, but such information is available only at local level.

Therefore, it is reasonable to say that micro-studies at regional or sub-regional level would distinctly reveal the undisputable facts on the existing problems that can most likely be very far away from the average Kenyan officials' problems which are usually stressed. Therefore, the purpose of this section is to highlight some of the basic problems connected with information on livestock resources at the smallest socio-economic unit level so as to use it for a further constructive analysis in the coming chapters of this study.

Types of livestock

The Pokot raise "Humped zebu cattle" which is considered as a sub-type of Boran. But, it is often referred as the Humped cattle of Karamajong type. This type of cattle is not only common among Pokot (or Suk) but as well among the Jie, Turkana, Karamajong and the Toposa and Boya of Equatoria Province of Sudan (Cf. Pratt and Gwynne 1977: 145-46).

The small stock, that is sheep and goats, are also raised by the Pokot. Both are tropical fat-tailed types of stock. Goats are more valued than sheep, above all by those individual households which are more pastoral nomadic in characteristics. In addition, insignificant numbers of donkeys have been observed. However donkeys, poultry and other minor livestock are not included in this study.

The inventory of livestock resources

Virtually no reliable field survey has been undertaken concerning livestock population census, except scanty information from old studies (e.g. Schneider:1953) or general and most likely unreliable figures from the District Commissioner Office, both during the colonial and post-colonial periods. Therefore, the lack of fresh and accurate data makes a detailed comparison practically impossible, specially at a micro-level.

Nevertheless, just before the introduction of the group ranch in Kongolai in 1972, a sort of feasibility study had been undertaken in an ad-hoc manner by the range management division and the result indicated that 412 families had 7373 cattle and 15964 shoats (absolute figures), that is, roughly an average of 17.9 cattle and 38.7 shoats per family (Cf. S.R.D.P/OP 12 1975:10-13). The cattle figure is too low for the given period but the shoat average can be a reasonable estimate.

In my view, before the formation of the group ranch, the inhabitants of Kongolai were more or less practising pastoral nomadism in the strict sense of its meaning. Then, it is undoubted that they must have had more than 18 cattle per family. This argument is supported by Widsstrand (1972:6) who stated that each family had a little over 30 head of cattle in the same area. Actually, the reliability of the livestock data given by the range mana-

gement is even critically questioned by the author who compiled the S.R.D.P/OP's report.

In any case, since the early seventies, a radical social and economic change has occurred in West Pokot. As a result the different constraints and opportunities which followed this change, have molded the condition of each socio-economic unit in the areas concerned, leading to more and more intensive livestock rearing in a specific space over time and even further acceptance of diversification of their means of food production and sources of income. Thus, it is reasonable to expect a lower size of herd per family and relatively better method of organizing resources and operation of their activities.

In terms of the inventory of livestock in the areas surveyed as shown in table 3.8, the general conditions of the district of West Pokot are reflected. A mixed type

Table 3.8. A resume of livestock inventory

Areas name	Total cattle		T. shoats **		T. stock
	Absolute no.	s.u.*	Ab. no	s.u	(in s.u)
Chepareria	8270 (1338)	3107	5594	699	3806
Kongolai	5605 (968)	2106	7394	924	3030

Source: The field survey of 1979.

N.B. The figures in brackets are the bound on the error of estimation at 95 per cent confidence level.*See appendix 1 how the number of livestock is converted to stock unit.
 ** This column is the sum of 3280 goats (error 662) and 2314 sheep (error 502) in Chepareria and 5839 goats (1188) and 1555(310) in Kongolai(shoats= sheep plus goats).

of rearing domestic animals prevails in both project areas, that is, cattle associated with goats or sheep or both. However, for a Pokot, cattle is the most valuable of all and it has deep roots in their culture (Schneider 1967). That is why, in both sub-regional units, cattle predomi-

nates over the two other types of livestock. A herd* which consists of small stock is rare because it is a clear indication of poverty in the eyes of the Pokot. The small stock is often associated with cattle and the predominant ones are goats.

The composition of the herd

For pastoral nomads or agro-pastoral nomads, it is a sine-quaque requirement to assess and allocate meticulously their livestock resources at hand, as sedentary cultivators assess the potential of their land resources, the yield of a given crop(s) which is intended to be cultivated, the available labour (or human-time), the tools, the environmental constraints, their know-how at hand and other essential information resources. It is for this reason that in chapter 4 pastoral nomadism as an activity system is sub-divided into husbandry sub-activity noting the mental assessment and allocation of resources, and herding sub-activity stressing the operation involved in the supply of biotic-food energy (pasture) to the domestic animal. In other words, any change introduced during the processes of intensification would demand an interpretation of the livestock resources within the "portmanteau" of the newly established technical socio-bio-ecological system of the people in question.

The composition of each herd can be conceived as part of the result of the husbandry sub-activity. The output in the form of livestock and by-products of livestock is determined by the composition of a given herd (Fricke: 1979). These tasks which are always meticulously undertaken, are assessed resources being sub-divided into cattle and small stock. Obviously, cattle is given high priority.

Traditionally, pastoral nomads who depended entirely on livestock and its by-products, ought to have 3.5 s.u. of livestock per individual, with cattle constituting 80 per cent of the whole herd of a given household in the areas studied (Cf. Pratt and Gwynne 1977). Nowadays, as a result of new means of food production and the integration into market institutions, such a division between

*A herd is defined in many ways in the literature on pastoral nomadism. In this case, it simply means a unit herd owned by a single or extended household.

cattle and small stock is irrelevant. The small stock are becoming important subsistence and marketable products. But, overall it seems that the association of small stock with cattle is considered by the Pokot as being determined by the actual socio-economic and bio-physical conditions of their areas.

The value of cattle is unlimited both economically and socially in the Pokot society, It may be sold on the market or exchanged to obtain grain, other goods and stock. It may be used as a median to establish social ties e.g. "Tilia"*, dowry etc... (Cf. Widstrand 1972). But, it should be clear that these social ties do not mean that they do not have implications for their economy.

In the old anthropological study of Hershovits "The cattle complex" (1926) was conceived as the most prominent yardstick of power, prestige and status which had very little meaning for the subsistence or market economy of the people in question. Since then, many studies of prominent researchers have revealed a different view on the same issue. Concerning Pokot society the work of Schneider (Cf. 1953, 1957) is substantial evidence. Indeed, cattle are simply one of the available means which is exploited to improve the quality of life for the contemporary Pokot.

According to the Pokot culture, a unit of cattle is identified as it is classified in table 4.8. Above all, cows are the most important productive capital through the bearing of calves and production of milk. Hence, they are not slaughtered until their productive capacity declines. That is why, the importance is patently indicated by the dominance of the cattle composition. It constitutes 44 to 57 per cent in the two areas surveyed. However, all cows are not milk producers at the same time. Some

*The institution of "Tilia" establishes a high degree of cohesion and solidarity in the society. It consists of a partnership between non-clan members from different locations of a given regional space. In this exchange, when one receives a cow, the other gets a steer. But, the receiver of a cow is expected to give to the former possessor some of the calves of the cow and other favours. Tilia can be regarded as a means of spreading the risk of losses or dispersing one's wealth or relieving oneself of the labour constraint or a means of not depleting a producing cow for meat resource etc..." (Cf. Schneider 1953, 1957, Widstrand 1972).

Table 4.8. The composition of the herds

Type of livestock	Composition (in %)		Average*		Percentage of each group of the total stock **	
	Chepare.	Kongo.	Chepareria	Kongolai	Chap.	Kong.
Calves	20.7	19.5	5.0(0.9)	5. (0.7)		
Heifers	13.1	11.4	3.2(0.5)	2.9(0.8)		
Cows	43.7	57.5	10.5(1.8)	14.6(2.7)		
Bulls	9.9	4.4	1.4(0.4)	1.1(0.3)		
Steers	12.5	7.2	3.0(0.8)	1.8(0.6)		
Total cattle	100.0	100.0	24.2(3.9)	25.5(4.4)	81.6	69.5

Sheep	41.4	21.0	6.7(1.4)	7.1(1.4)	7.6	6.4
Goats	58.6	79.0	9.6(1.9)	26.5(3.4)	10.8	24.4
Total shoats	100.0	100.0			18.4	30.5

Total livestock					100.0	100.0

Source : The field survey of 1979.

* The figures between brackets indicate the minimum and maximum range of estimates which allow me to state that I am 95 per cent confident that the true means of each type of livestock lies within the given plus and minus range.

** Before the computation into percentage of each group, the quantity is converted to stock units.

N.B. According to information gathered on the field , a calf is defined as a young animal under one year and heifer is a female animal that has not given birth (appro. 1-3 years). A cow is usually a mature female animal that has given birth. Among them barren cows can be found . A bull is an uncastrated animal reserved for breeding purposes. It can be sub-divided into mature (approximately, 3 years) and immature (less than 3 years). Finally a steer is a castrated male animal.

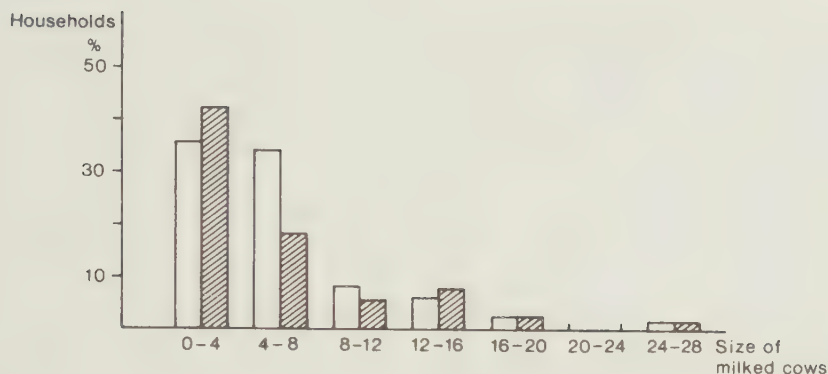


Fig.2.8. Distribution of milked cows by households (in%) in the areas surveyed. The shaded histogram represents the case of Chepareria, while the other of Kongolai.

of them are fallow-cows as referred to by Dahl and Hjort (1976). Besides, the Pokot's cow supplies, as all the other East African indigenous female animals, a very low milk yield; an average of 1-3 litres per day. Usually, the milk yield per cow differs in the dry season and wet season and in accordance with the method of herding activity. Therefore, many cows are needed if a continuous supply of milk is a necessity. The graphic illustration figure ... suggests that the households which do have 1-8 milk producing cows are significant in Kongolai. Whereas, Chepareria is dominated by households with 1-4 milk producing cows. In contrast, Chepareria's superiority in relation to large size units of milk producing cows e.g. more than 12, is apparent. However, their distribution in the geographical space as it will be seen on the map (fig.5.10) clearly shows that most of the large size herd owners are outside the land privately owned. Conversely, it is reasonable to assume that only a small number of milk producing cows are found on the private land, showing indirectly their low dependence on livestock and its by-products.

The other types of cattle except steer, are the inputs which guarantee the continuity of the livestock production over time. In connection with this fact, some maintain that certain types of cattle of pastoral nomads are unnecessarily many, basing their arguments on the number of cows that can be served by a bull (Williammson and Payne 1974, Schneider 1957:287-288). Referring to the same issue, Dahl and Hjort (1976:29) clarified the matter

by saying "the nomadic pastoralists keep more bulls than the necessary minimum as a security against losses. "But, in certain cases, where there is a strong indication of the decline in the loss of cattle, the number of bulls could still be unrelated to the number of female cattle. Thereby inferring that the causal-factors are many, e.g. type of herding practices - independent livestock herding at household or extended household level, is more common than in the past. This is mainly due to new land policies, higher involvement in farming and other activities which, in turn, force each household to acquire its own bull for breeding purposes, especially in areas where there is a complete absence of the use of artificial insemination or collective use of a good breeding bull. This will indicate, obviously, many bulls at the aggregate level.

Therefore, the understanding of the contemporary allocation of livestock resources demands the interpretation of husbandry and herding activities within the context of the actual different methods of land use and even the market condition of livestock resources. Then, to what extent does the composition of herd of these people differ from the fifties?

The main difference that can be deduced from table 5.8 is that, the percentage of calves has increased almost by 100 % and even the reduction in bulls is evident. Of course, the mortality of calves is undoubtedly lower than the fifties as the result of better access to veterinary

Table 5.8. A comparison of composition of herd in relation to the fifties:

The project areas	Calves	Heifers	Cows	Bulls	Steers	T. cattle
Chepareria	20.7	13.1	43.7	9.9	12.5	100
Kongolai	19.5	11.4	57.5	4.4	7.2	100
Average	20.1	12.3	50.6	7.2	9.9	100

Schneider's figures(1953)	10.9	15.8	44.6	13.9	14.9	100

N.B. The 1953 livestock figures provided by schneider is information gathered from the Mnagai location.

services (Cf. FAO 1972, West Pokot District Ann. Report 1978, 79, 80). However, further enlightenment on change in cattle rearing can be grasped through consideration of cattle distribution within the different households of the areas surveyed.

Cattle distribution

The overall average as noted in table 4.8 is 24 and 26 heads of cattle for Chepareria and Kongolai respectively. These estimates are not very far from the figures presented in the old studies e.g. Schneider average figure for the district was 33.5 per family (Cf. 1953:192) and Widstrand 1972:6) as mentioned earlier gave over 30 head of cattle per family for Riwa location (Kongolai).

Nonetheless, the most interesting enlightenment that can be obtained is through examining the cattle distribution among the households of the given areas. The graphic representation in figure 3.8 elucidates patently that cattle are much better distributed among households in Kongolai than in Chepareria. For example, the majority of the herds' owners in Chepareria have 1-20 head of cattle. Whilst in Kongolai 10-40 units are more significant.

In both areas, polarization of cattle within large and small herd units have already appeared e.g. 35.5 % of the total cattle is distributed among 71.8 % of the households in Chepareria, whereas, in Kongolai 38.4 % of the total is distributed among 67.4 % of the households.

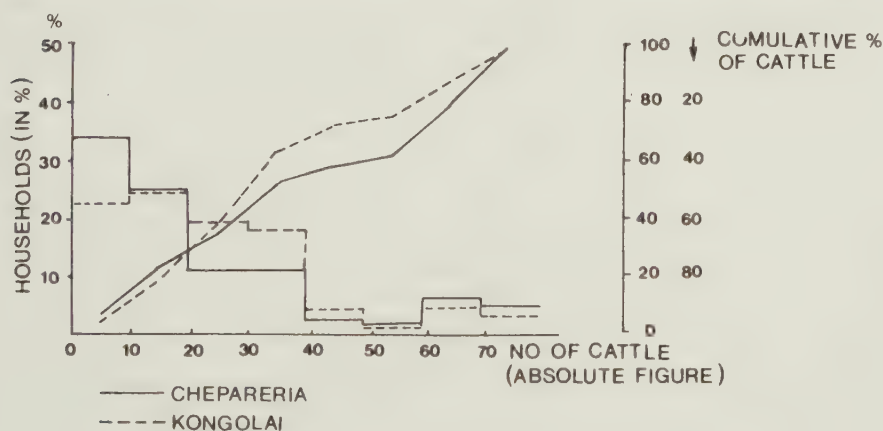


Fig.3.8. Distribution of cattle by households.

This means that 28.2 % of the households own 64.5 % of the total cattle and 32.6 % of the households have 61.6 % of the total cattle in Chepareria and Kongolai respectively. It also seems that the trend of polarization is sharper in Chepareria than Kongolai. The middle size cattle units have declined while the large and small size units are increasing. This trend is clearly indicated by the contrast seen in figure 3.8 within cattle size units 30-40 and above 60 head of cattle.

The illustration, then, is sufficient evidence to allow me to state boldly that the measure of destocking, if it is necessary, ought to concern more the minority of large size herd owners rather than the small size herd owners. Perhaps, it may also be easier to approach these few individuals through provision of new incentives which facilitate the implementation of destocking, than to impose this policy irrespective of the existing number of cattle among households of the areas in question.

All in all, it can be summed up by noting that there are difference both in the way in which cattle are distributed in the two areas surveyed and among households within each area. In view, of their geo-physical conditions, although Chepareria is slightly better endowed with natural resources, especially along the "pied-du-mont" of the Cherangani hills, in its southern tip (see fig. 2.5), there is no significant difference between the two sub-regional areas. Both are identified as eco-climatic zone IV. Hence, some of the differences pointed out can be explained in a much better way in relation to the existing land tenure system, the available labour, their involvement with other kinds of economic activities and the social amenities accessible to individual or extended households.

Goats and sheep as a sub-unit of the herd

Goats and sheep have gradually been regarded as important with intensification of pastoral nomadism. Like the movement from shifting cultivation to crop rotation which needs re-arrangement of the existing resources and further new inputs, pastoral nomadic societies as well are forced to re-arrange their resources and even to introduce new inputs when their activities are constrained by new circumstances. Obviously, the increase of goats and sheep as a sub-unit of the herd, reflects the scanty choices or opportunities which they have.

The Pokot who had mainly been interested in cattle, have begun to put more importance on small stock. A plausible reason could be a) the continuous reduction of their grazing areas b) the small stock are reproduced more quickly than cattle and can be converted to cash at any time of the year within or outside the given sub-regions. In other words, they are regarded as essential complementary sources of income as well as food products. c) The increasing acceptance of the small stock is also a clear indication of the systematic exploitation of the limited bio-organisms (pasture) within the households' reach e.g. goats prefer shrubs and leaves of trees, while cattle and sheep thrive grassland (Swift 1973). Finally, sheep can be reared near the farm without affecting the allocation of labour on farm activities and it is the best animal that can be kept mixed with cattle. For both are grazers and they have a preference for short distance movement so as to keep them in good condition. In general, cultivators who invest most of their labour (human-time) in farm activities, have preferences for those livestock which do not need long distance movement and are most likely grazers.

In terms of figure 4.8 in Kongolai both sheep and goats are well diffused. Relatively speaking, it has a very low percentage of households which do not raise small stock vis à vis Chepareria. This implies therefore, that the inhabitants attempt to intensify their activities through reconstruction and diversification of the existing types of stock.

The circumstances within each area as well, indicate the existence of a wide gap. For instance, in Chepareria 82.5 % of the households own only 44.5 % of the total number of goats while only 17.5 % own 55.5 % of the goats. In Kongolai 16.5 % of the households own 44 % of the goats indicating a better distribution among households.

Sheep are, in general, small in number in relation to goats in both areas and their distribution is much closer than the other types of livestock. In spite of this fact, sheep of large size units are more numerous in Chepareria than in Kongolai.

In short, it is reasonable to presume that the number of small stock will increase in the near future with the gradual processes of the intensification of pastoral nomadic activities. This trend, in a sense, is not a new phenomenon. For instance, as late as the fifties in the highlands of West Pokot where farming is widespread, there

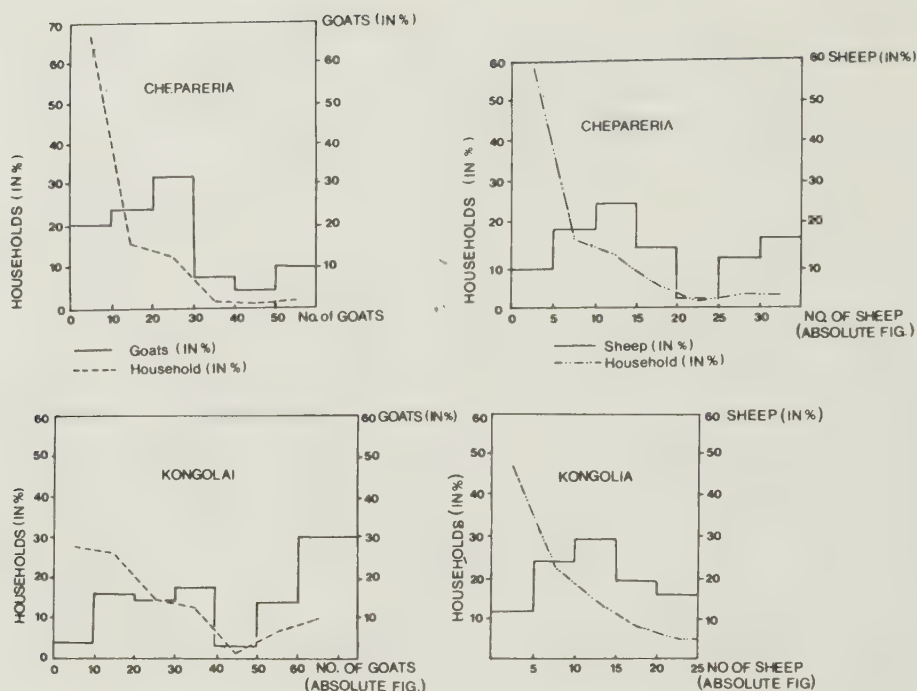


Fig.4.8. Distribution of small stock (sheep and goats) by households (in %) in relation to the percentage of the total small stock represented in each group of small stock.

were more sheep and goats in relation to the lowlands where pastoral nomadism is predominantly significant. (Cf. Schneider 1957:279).

Furthermore, since there is a high anticipation of beef deficit by the eighties, the notion that meat production from sheep and goats should be increased and used as a substitute for domestic beef consumption, is one of the ambitions of the Kenyan government. With the appropriate incentives e.g. reasonable prices for the small stock, improvement of economic infrastructures etc..., the government would have a greater possibility to fulfil its aim. In addition, the markets for sheep and goats are unlimited internally as well as externally e.g. The middle East markets (Cf. FAO 1972). Therefore, it is not difficult to foresee the prospects for the production of sheep and goats.

Up to now the analysis of livestock resources has been

discussed by separating them by type. But in reality, each herd is a mixture of both. Thus, it is worthwhile noting whether there are circumscribing factors behind the way in which the types of domestic animals are selected.

The association of different livestock

The organization of livestock into cattle or cattle and small stock to form a herd unit, seems largely to be conditioned by many factors e.g. bio-ecological environment or in general by the socio-economic conditions of a given stock owning household. For instance, it is evident that the farming activities circumscribe the herding activities which, in turn, determine the husbandry and herding activities as discussed in earlier chapters. Let us examine the relevance of this fact within the areas surveyed.

In both sub-regions, cattle, goats and sheep as a unit is quite significant as suggested in table 6.8. Nevertheless, its relative significance in Chepareria is much lower than Kongolai, that is, 59.3 per cent and 79.0 per cent respectively. What is worthy of note are the facts that a) units composed solely of cattle rate low in frequency in Kongolai and units composed of cattle and sheep are absent. b) In contrast 31.4 per cent of the units of herds in Chepareria consist of cattle and a mixture of cattle and sheep. Earlier, it has been pointed out that these two types are grazers which are often associated with crop cultivation.

Goats are frequently associated with cattle in Kongolai, mainly due to the abundance of browse (shrubs and trees) in the ecological niches of Kongolai and most likely because of their limited engagement in crop cultivation.

Table 6.8. The association of types of livestock.

Types of units of herd	Chepareria	Kongolai
Cattle	20.3	12.6
Cattle +sheep	11.1	-
Sheep + goats	0.2	-
Cattle + goats	9.1	8.4
Cattle + goats + sheep	59.3	79.0
Total	100.0	100.0

Source : The field survey of 1979.

The livestock resources from a dynamic perspective

So far, the central topic of the discussion has been a static livestock resources assesement. But, it is inherent that livestock resources are variable in time specially in pastoral nomadic zones. For example, the performance of the domestic animals traditionally depended on various conditions e.g. the erratic conditions of rainfall, which affect, in turn, the water pasture conditions, the prevalence of diseases, raidings etc... Consequently, the possibility to increase or deplete one's herd within a short time was high. But nowadays, new opportunities have been created and the magnitude of the old constraints are highly minimized. Therefore, it can be said that the trend towards fluctuation of livestock resources, at least within a given annual cycle, is very minimum. Nevertheless, one still cannot rule out the effect of the dry season and wet season on livestock resources.

In effect, it is extremely difficult to prepare reliable forcasts on livestock resources because there is a great scarcity of reliable statistical records on calving, mortality and culling rates. The two areas studied suffer from the same problem. Thus, I was forced to apply an approach which can only give general information by adopting the trends of change in livestock resources of the two I.R.S clusters from the Mnagei location*, situated 25-30 km.

*The Central Bureau of Statistics (C.B.S) in connection with Integratd Rural Survey Programme of 1978-79 had two clusters within Mnagei location, West Pokot(see fig. 1.5), as sample bases for collecting data on socio-economic variables at household level. From these areas, they had data on all types of livestock from Nov./Dec. 1978 up to Oct/Nov. 1979 in continuity. Within the same period, I had collected the livestock data from the areas studied in the months of April/May 1979 which I considered as the opening position for my calculation. Based on the multiple factors acquired from the C.B.S data I was able to interpret the data of April/May 1979 in terms of the monthly trends in livestock changes obtained from the C.B.S data (for further information see Appendix 2). As a result, it was possible to project my collected information on livestock resources backwards up to Nov./Dec. 1978 and forwards up to Oct./Nov. 1979.

Table 7.8. The estimated average livestock production (in s.u) per household from Nov./Dec. 1978 to Oct./Nov. 1979 in Chepareria and Kongolai.

Chepareria	Nov./Dec.	Dec./J.	J./Fe.	Fe./Mar.	Mar./A.	A./M.*	M./Ju.	Ju./J.	J./A.	A./Sep.	Sep./O.	O./Nov.
Average livestock (in s.u)	10.2	10.5	10.5	9.5	10.9	11.1	10.5	11.3	11.5	11.7	11.8	12.0
Cattle in % of the T. livestock 82.	84.		85.4	81.1	81.6	81.6	81	81.3	82.1	81.1	81.1	81.3
Shoats in % of the T. livestock 18	16		16.6	18.9	17.4	18.4	19	18.7	17.9	18.9	18.9	18.7

Kongolai												
Average livestock (in s.u)	12.7	12.8	12.8	11.7	13.4	13.8	13.2	14.0	14.1	14.7	14.7	14.9
Cattle in % of the t. livestock 69.8	72.7		71.9	68.6	71.5	69.5	68.3	69.0	70.4	68.6	68.8	69.1
Shoats in % of the T. livestock 30.2	27.3		28.1	31.4	28.5	30.5	31.7	31.0	29.6	31.4	31.2	30.9

N.B. *The opening position with data of the field survey of 1979 . The other estimate is prepared based on the C.B.S data.

from the areas surveyed. Obviously, the figures obtained which indicate the monthly changes in livestock resources must be accepted with reservations, in as much as this is a rough estimation. However, it is certain that they show a great deal of the circumstances of livestock resources of the areas studied.

As indicated in table 7.8, it was possible to estimate roughly both the average livestock (in s.u.) per household and the percentage of cattle and shoats available in each household during the whole cycle, that is, from November/December 1978 to October/November 1979. Annually, the stock seems to have increased by two stock units, which means 4 head of cattle and 3 shoats, and 4 head of cattle and 5 shoats in Chepareria and Kongolai respectively.

It seems also that both the long and the short dry seasons have negative effects on the size of livestock resources. In addition, the table suggests that the small stock seems to be of greater importance to the inhabitants of Kongolai than Chepareria, consisting approx. 30 per cent of their herds. Actually, the small stock which require poor quality pasture, which multiply within a short time, and which can be converted to cash at any time of the year are gradually replacing cattle. This trend is a common phenomenon observable in most marginal areas (Livingstone 1981). The reason could be due to scarcity of pasture or high demand for small stock both in the local and national markets.

In general, livestock is a resource of great importance in establishing a socio-economic unit in the areas studied and each family still raises a large number of livestock. But, there is substantial evidence which suggests that a small percentage of the households are owners of the majority existing herds in the two areas surveyed. Thus, it is more sensible to encourage destocking first among this minority group than to apply this measure to all the resident families.

CULTIVATED LAND AS A COMPLEMENTARY RESOURCE

As mentioned earlier, at the turn of this century the inhabitants of Chepareria and Kongolai were pastoral nomads. Since then, they have gradually adopted cultivation so as to establish a mixed economic system. Cultivation of crops, therefore, has become equally as important as livestock resources. In certain cases, its importance

is predominant over livestock resources.

In the old days, a continuous spatial mobility of both human and livestock resources, which are the underlined features of pastoral nomadism, was required not only to provide biotic food energy for the herd, but it was also to avoid the disease infested areas, raiding and occasionally to evade tax payment. On the whole, it was a laborious task and did not allow the undertaking of other activities which pre-required human-time allocation particularly at a given location for a prolonged duration. It is the same constraint which was stressed by Schneider, who noted:

"Most Pokot....would certainly abandon agriculture, not because they dislike it but because they would not have time enough to herd and cultivate (1953:225).

In addition, even though the livestock were distributed unequally among households, there were mechanisms embedded in the social system that exert a continuous redistribution of livestock resources over time among households located in different geographical space e.g. inheritance, stock-friends ("Tilia"), bridewealth, raiding etc... Thus, the status established in accordance with size of livestock resources in the society, was a temporary issue and there were many sources of acquiring livestock resources. Parallel to this, land was an abundant and free resource accessible to all. In other words, there were limited incentives to cultivate land.

Today, the same area is constrained by population increase owing to natural growth and immigration from the highest potential areas, new land policies, a centralized administration system and other social and economic services. As a result, the traditional dynamic system of livestock circulation in space and time is greatly curtailed. With the change in behaviour of spatial mobility, the livestock unit of each household was relatively reduced. The opportunity for a redistribution of the livestock resources embedded in the social system was greatly distorted by the same constraints. As we have seen, the family unit's structure gave way to a new structure. Land has become a scarce resource that demands an efficient land-use programme both in time and space dimensions. Subsequently, a different type of inequality has clearly emerged.

However, when the traditional pattern of scattering human resources in space and time to undertake husbandry

and herding activities, raiding and protecting the herd from the wild animals and raiders etc..., was more or less abandoned, and replaced by a relatively packed activity system whereby the husbandry and herding activities are performed in strictly confined area around the dwelling locations, a lot of human-time was made available. In other words, what it was impossible to perform in the past due to human-time constraint, was made possible as a result of modifying the spatial pattern and process of their activities system. Subsequently, it was made possible to increase relatively the productivity of land resources by incorporating crop cultivation into livestock rearing. It is with this course of historical development as a background that cultivation of land emerged as one of the prime sources of food as well as of income.

As a result, the diet of the inhabitants of Chepareria and Kongolai is constituted of both livestock and crop products. A maize posho, for instance, is one of the typical foods found among the Pokot. Hence, clusters of small grain storehouses are actually part of the scenery in the settlements of the Pokot, particularly in the areas studied.

Size of the holdings

Generally speaking, the terms farm or holding are often used synonymously. However, the team of the Integrated Rural Survey (IRS) has made a distinction between the two words. While the farm strictly describes only registered farms on the land registration lists of the district land offices; the holding in the other hand, is the normal unit of definition and reference. The integrated rural survey defines it as "the land associated with a household being used wholly or partially for agricultural purposes and being managed as a single economic unit under the overall control and direction of the holder" (Cf. I.R.S 1974-75).

Farm or holding could be used as a reference to the private holding, since each holding is registered when land is adjudicated in Chepareria. Evidently, figure 5.8 gives an indication of the holding size of Chepareria under the freeholding tenure system. In general, a unit land which is regarded as a large farm is around twenty hectares (approx. 50 acres) and the typical national small unit falls within two to three hectares in Kenya. In view

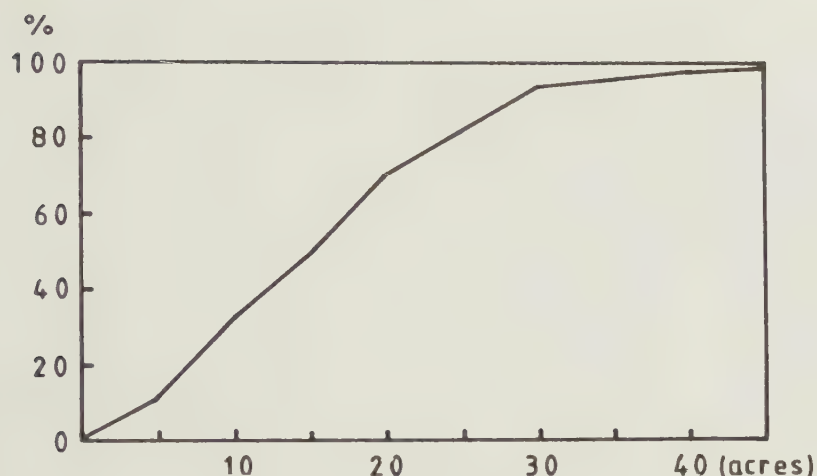


Fig.5.8. Percentage distribution of private holdings in Chepareria by holding size.

of this fact, the majority of the holdings in Chepareria can be regarded as both small and medium size units. But, if we consider the fact that the land is marginal, we should conclude that the holdings in most case are small. This survey suggests a median of around 15.7 acres (6.4 hect.) and an average of about 17.2 acres (7.4 hectares).

The American Technical Assistance Corporation (ARAC)'s study report on the Small-holder Production Services and Credit Scheme (SPSCP) in Eastern Province in Machakos in 1977 (a marginal area) gives an estimation close to this survey, an average holding size of 13 acres (5.3 hectares)(Cf. Kenya-Marginal/semi-arid Lands Report, no. 3:1978).

Another problem which was not envisaged at the beginning of the field survey is the fact that the exact size of the pastureland in the private holdings has not been easy to estimate, although questions on the allocation between crops fallow and pasture were intended to be depicted accurately in the formulation of the questionnaire. This is because part of the permanent fallow is not only arable but may have also limited potential or none at all as a source of biotic food for livestock due to soil erosion.

Thus, the interpretation of figure 5.8 which describes the size of the private holdings should be considered with great caution, particularly when the cultivated land is compared to land left fallow. As a result, you will observe in other chapters that the frequency with which

a parcel of land is cultivated and left fallow within a holding, is considered as relevant information that permits us indirectly to grasp the potential of each "holding" rather than the simple absolute size given in the above graphic illustration.

Whereas in the areas where land is under the County Council Trustship (a traditional tenure system) or adjudicated group ranch, the land of the households that can be identified explicitly is only the plots occupied by cultivated crops (see figure 6.8). Yet, each holder is claiming not only the cultivated land, but the fallow plots as well so long as the plots have been frequently ploughed over many years. However, such a claim ultimately depends on the decision of the council of elders (Kokwa) or the group ranch Committee within the trust land and group ranch respectively. In short, a holding should be conceived in these areas, as a unit of operation in a specific time and not of ownership.

But, it should be made clear that the trust land and the group ranch should not be confused and regarded as having similar rules of tenure (see chapter 7). Each holder of the cultivated unit within the group ranch is not as free from constraints as in the trust land, to expand or occupy a land for cultivation purposes.

Size of cultivated acreage

Let us turn to land farmed by each unit during the annual cycle of the survey period, and assess its implication to the other resources involved. Usually, it is convenient to argue on the level of farming activity based upon the area cultivated annually, but it is as well to remember that the area cultivated gives only partial information. For example, there are two cropping seasons for certain crops e.g. beans etc... on the same plot of land during the same season which indicates the need for following the operation of farming activities over time. As a whole, double cropping is generally determined by the type of crops, the seasonal rainfall and labour circumstances.

Nonetheless, since the survey on cropping has been undertaken in the middle of the agricultural season, it is believed here that the information more or less covers the occurrence of double cropping. In any case, it is worthwhile noting that such practices and level of intensification distort the information acquired from the size

of the area cultivated.

The range of the size of farmed land varies very much within each survey area and between them as indicated in figure 6.8. Thus each producer cultivated annually an average of 3.2 acres (1.3 hect.) with an error range of 2.7 - 3.7 acres (1.1 - 1.5 hect.) in Chepareria, and an annual average of 2.4 acres (1 hect.) in Kongolai with an error range of 2 - 2.8 acres (0.8 - 1.1 hect.) in both cases at 95 % confidence level.

In short, it is apparent that cultivation in Chepareria is very significant and the farms are in the processes of expanding, especially if contrasted with the situation of early fifties (Schneider, 1953, West Pokot Annual Report 1958, 1966). Today, for instance, more than 40 % of the households in Chepareria farm land between 3 and less than 6 acres, but only 17 % of the households in Kongolai cultivate the same size of land. Similarly, the superiority of Chepareria is distinctly clear among the large cultivators. Around 6 % of the households in Chepareria allocated more than 9 acres of land for crop production. On the contrary, the maximum cultivated land in Kongolai

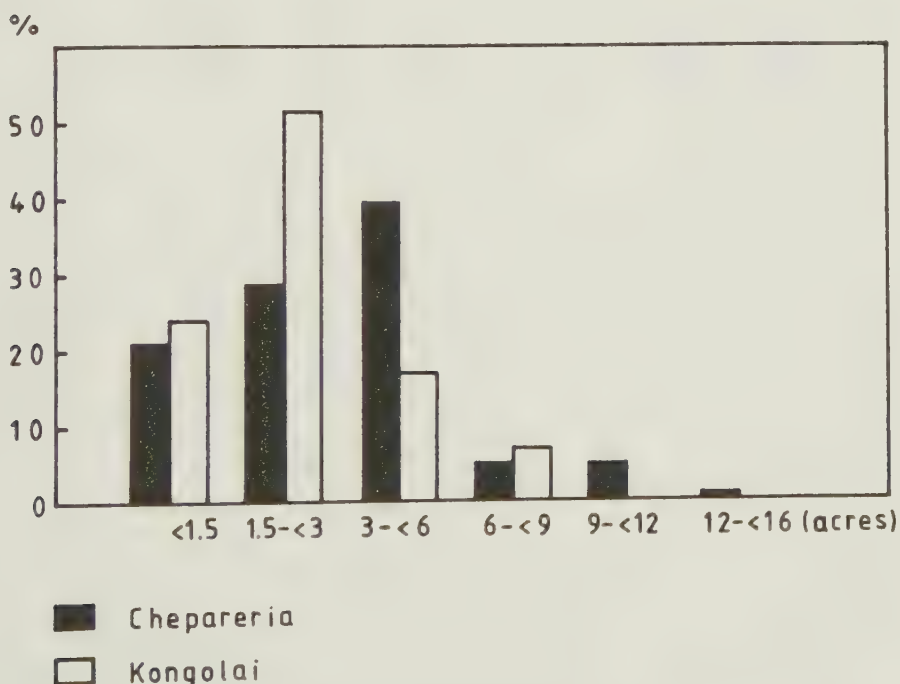


Fig.6.8. Annual cultivated acreage (1979).

was around 6 acres, belonging to 7 % of the total households, but the majority of the inhabitants cultivate land of between 1.5 to less than 3 acres. These differences between the two sub-regional spaces, in the actual sense, should not be regarded surprising because if these findings are correlated to the fact noted in chapter 6 concerning the existing disparity of livestock resources both within households of each area studied or between the two, they will be easily justified.

In other words, it is the existence of a large scale livestock resource which is one of the main reasons behind the unequal distribution of farmed land. The other factors which are an impetus for the existing disparity in the distribution of cultivated land and most likely of livestock resources will be discussed in the coming chapter.

Then, the illustration in figure 6.8, albeit points out the land resource allocated for cultivation purposes, it does not disclose the full picture of the engagement of the actors. Therefore, the analysis of land cultivation as an isolated case should not be discussed beyond this level.

On the contrary, an appraisal of allocated land resources with the available livestock resources of the socio-economic units, would undoubtedly provide not only the quantity of resources involved but also how the two sectors have been constrained by each other's conditions. For instance, the human-time (labour) utilized for cultivation, may affect the pastoral nomadic activities which in turn affects the size of the livestock resources. The abundance of livestock resources may also reduce the aspiration of cultivating land of a substantial size.

In any case, the diffusion of cropping is evident from the fact that 98 % and 90 % of the households of Chepareria and Kongolai respectively had cultivated land in 1979. Furthermore, it does not always mean that the few remaining are entirely dependent on pastoral nomadism. Particularly the households in Chepareria are all potential crops producers.

THE HUMAN, LIVESTOCK AND LAND RESOURCES

The graphic representation (figure 7.8) illustrates clearly some of the problems that crop up in a mixed agro-livestock economic system. The illustration is more interesting because it includes the human resources available in each

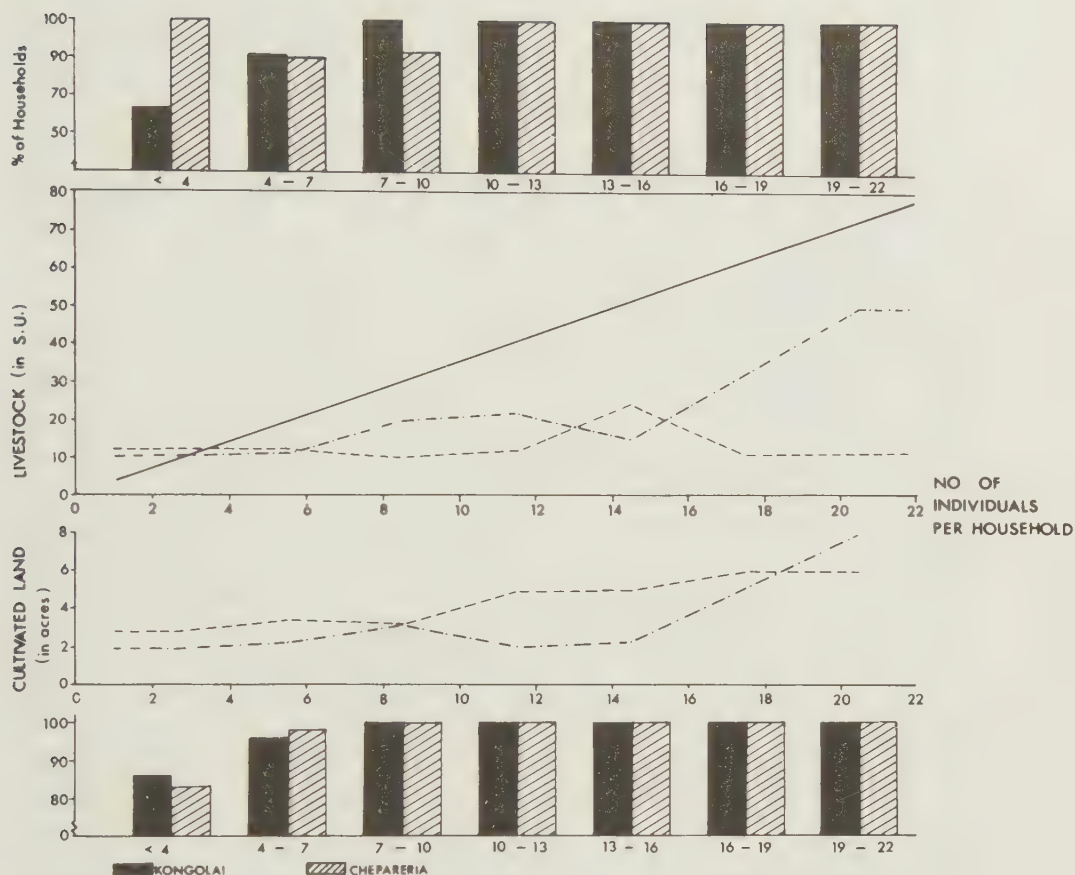


Fig.7.8. The potential human resource, the cultivated land and livestock resources forming the activities system of the two areas studied. In the graphic representation, the solid and digonal line shows the livestock needed (in s.u) to satisfy the subsistence needs of households of different sizes. While, the broken lines indicate the households'engagements in crop and livestock farming of chepareria , the broken lines with dots represent the households'engagements of Kongolai. The histograms on each side of the graph illustrate the percentage of the total households represented in each group of households which are involved in crop or livestock farming. For example, 57 per cent of the households of 1, but less than 4 individuals are engaged in livestock rearing and 86 per cent of the same group of households are partly engaged in crop cultivation in Kongolai.

group of households involved, indicating roughly the number of consumers of the livestock and cultivated products or suppliers of human-time to undertake the different operations of the mixed economic system.

We have seen the part of the graph which indicates the distribution of the livestock unit of households of different sizes (see chapter 6). In addition, a histogram is added to show the percentage of households represented in each classed group size of households for a specific sector of their economy, e.g. in Chepareria and Kongolai, those households which do not own livestock resources are within group size 4-9 and 1-6 individuals per household respectively. However, as the number of individuals per household increases, their involvement in livestock rearing and cultivation coincides to 100 %. Furthermore, the low participation of households in e.g. livestock rearing, incites a desire to divert our attention to the level of the activities of the same group of households on land which they cultivate simultaneously. Therefore, the addition of the histogram is very essential to disclose a full picture of their economic engagements.

The lower part of figure 7.8 shows the size of land cultivated by households of different sizes in the two areas surveyed. Here also, the percentage of each group of households engaged in land cultivation is demonstrated by histogram e.g. in Kongolai, although the households of 1-3 individuals can clearly subsist on livestock resources, households represented in this specific group are only 57 per cent of the existing total households of the group. Hence, it means that 43 per cent of the households must subsist entirely on cultivated products, 14 per cent on livestock resources and 43 per cent on both. Subsequently, we observe a large representation from this group of households, when it concerns to cultivation of land, that is, 86 per cent which allocate an average of close to 3 acres per household. This implies that the majority of these households are more inclined towards crops farming than pastoral nomadism, but at the same time showing also the existence of a few households which may depend strongly on pastoral nomadism during this given annual cycle.

It has been noted (in chapter 6) that the distribution of livestock units among households of different sizes in Kongolai is much closer to their subsistence requirements than in Chepareria. As a result, figure 7.8 elucidates the reverse trend when it comes to the distribution of cultivated land. Chepareria's predominance is clear

not only in comparison to the size of the farmed land, but as well to the high percentage of participants in the crop farming sub-system of their economy.

Generally speaking, from the illustration presented, it is reasonable to say that the households of smaller size have more choice during the processes of allocation of resources. If their investments, for instance, tend to incline more towards pastoral nomadic activity, their achievements in crop farming will be certainly limited or in some cases may be abandoned. The reverse case is not uncommon. However, it is distinctly patent that all larger households endeavour to exploit both sectors of the economy to establish a viable economic life.

Therefore, it is possible to conclude that the growth of human population incites a higher investment in farming land. Theoretically, such trends of development should affect substantially the size of livestock units reared by the households. But this depends mainly on the existing land tenure system and also on accessible human resources that provide the necessary human-time to undertake pastoral nomadism. In certain cases, even the existence of private land ownership in marginal areas may not entirely circumscribe the strong desire to maintain a herd of livestock of large scale when the risk of farming crops is of a higher magnitude due to the environment factor, lack of incentives for improvement of land resources, and investment in new technology (see the coming chapter). Whatsoever the case, the introduction of farming will undoubtedly modify the pattern and process of leading pastoral nomadism and it will be more and more inappropriate to conceive them within the context of the traditional situation.

MIXED ECONOMY AND SUBSISTENCE REQUIREMENTS

In a way, the preceding discussion is a partial answer to the issue raised in chapter 6. It is now apparent that the inhabitants of Chepareria and Kongolai have raised the carrying capacity of their marginal areas with the growth of population by adopting farming alongside livestock rearing. The attempt is to establish a minimum of a viable subsistence economy and a maximum of producing surplus so as to earn cash. Of course, such a change must have been followed by re-allocation of resources, change of organization and even investment in new inputs. But, before I raise the issue of change of technique of opera-

tions, organization etc..., there will be an attempt to examine whether the majority of the people in question have reached or approached their minimum desirable goal.

I am fully aware that it is very difficult to quantify the subsistence food demands of the single or extended households of a given society, because the minimum nutritional requirements of calories and protein vary, being based on sex, age, body weight, work level, climate (temperature). Particularly, the needs of women increase during pregnancy and while nursing young, although women's requirements are generally lower in relation to men's (Cf. Porter, 1970:190, Upton 1973:13-15, Clark 1977:125-130). However, the approach in this case study tends to depict more the general circumstances of the households rather than a provision of a precise estimation of their subsistence food requirements.

Porter noted that in typical tropical African countries, the average recommended calorie requirement is about 2150 per day considering the age, sex pyramid and the other factors mentioned above. Brown (1971), basing his report on the FAO's census in East Africa, suggested that an average family of a pastoral nomadic society consists of eight individuals. Subsequently, since immature children are a large percentage, he estimated the size being equivalent to 6.5 full adults who require 15000 calories per day. This implies an average individual is considered to be 0.8125 full adult and to require 1875 calories per day consisting both of cereals and animal proteins. Another study in semi-arid central Tanzania indicates simply that an individual requires an average of 2000 calories per day (Cf. Christiansson 1981:191). On the other hand, Widstrand (1972) considers 2400-3000 calories for a working Pokot man which is actually an over-generous estimation. Evidently, experts on this issue have different opinions, which is actually to be expected. Thus, to be on the safe side, a more flexible estimation has been adopted here.

First, although the existence of a substantial percentage of children as members of the households has been pointed out earlier in the areas studied, Christiansson's suggestion is adopted regardless of age or sex differences, but not to estimate a requirement of a single person per day. It is applied to find the total requirements of households classed by group size as given in table 8.8.

Therefore, it infers that it is used to estimate the maximum calories demanded by a classed group of households rather than applying it to a single member of a household.

Table 8.8. Estimated calorie requirements of households by group size.

Size of households	Calorie requirements per day
1-3 persons	6000
4-6 "	12000
7-9 "	18000
10-12 "	24000
13-15 "	30000
16-18 "	36000
19-21 "	42000

This means that it is assumed that the majority within the group are most likely allocated more than 2000 calories per individual per day e.g. the need of the households with 4 individuals is estimated at 3000 calories per person.

Secondly, the result of the study confirms that the main staple crop of the people in question is maize. In spite of the marginality of the areas, hybrid maize is becoming more and more popular and replacing the traditional local maize as has happened in the central part of Kenya. Especially, in Chepareria it has been accepted by 62.13 % of the households. Whereas in Kongolai, they are a minority consisting of 25 % of the households. The remaining are local maize producers. Thus table 9.8 indicates the calories that can be available from hybrid or local maize from a unit of land.

Finally, the integration of the above two tables will yield information of paramount importance which can permit us to have a profound understanding of the circumstances elucidated in figure 7.8. For instance, the graphic presentation clearly shows that the majority of households in Chepareria have livestock units which do not meet the required domestic food demands. The households within group 4-6 and 13-15 individuals have more than or nearly 50 % of what it is needed for domestic food from their livestock resources. Except for households in group 1-3 which can supply all the food required from their livestock resources, the others have less than 50 % or very low e.g. all households above 16 individuals. It suggests

Table 9.8. Potential yields of food crops in calories

Type of crop	Yield per acre *	Calories per 100 grams**	Total calories yield per acre (000)	Accessible calories over the year
H.maize	1457 kg.	360	5245.2	14370
L.maize	728 kg.	360	2620.8	7180

Source: *West Pokot Annual Report 1979 pp.19

** Johnston , B.F 1958:126-27, Upton, M. 1973:14

***The total calorie yield per acre is divided by 365 to acquire these figures .

N.B. It is assumed here, that all the cultivated land was allotted to Hybrid maize or local maize. In reality, this is not the case. There are households which cultivate sweet potatoes, beans, millet, sorghum etc..., in addition to maize or maize interplanted with beans. Nevertheless, this does not contradict the basic assumption a great deal because, first the highest percentage of households are single maize or maize interplanted producers - 90 % and 71 % in Kongolai and Chepareria respectively. Interplanting beans with maize actually increases the yield per unit area and does not adversely affect maize yield if it is compared to a sole cropped maize (Cf. Palmer 1971:14, Hunt 1977:90). Besides, beans' calory yield is higher than maize - 376 calories/100 grams. Secondly, those households in Chepareria which cultivate sweet potatoes, sugar-cane, sunflower in addition to maize can be included here because they are crops with a higher protein content than maize (Cf. Upton pp.14). Broadly speaking, the largest percentage of cultivated land (more than 75 %) are maize or maize mixed with beans. Thus, the yield of the two crops can be a good basis for generalization.

then that the heavy reliance of the inhabitants on crop production and this fact is distinctly illuminated in figure 7.8. For example, the households within group size 13-15 individuals, which have the capacity to acquire nearly 50 % of their subsistent food needs from livestock

Table 10.8. The percentage of the required calories supplied by crop production.

Size of households	Required calories	The percentage of calories supplied from an acre of land	
		H. maize	L. maize
1-3 persons	6000	239 %	120 %
4-6 "	12000	120	60
7-9 "	18000	80	40
10-12 "	24000	60	30
13-15 "	30000	48	24
16-18 "	36000	40	20
19-21 "	46000	31	16

resources, cultivate an average of close to 5 acres of land.

Which infers that they can supply 240 % of their yearly food demands, if it is hybrid maize which is most likely because 62.1 % of the total households are hybrid producers or 120 % of their yearly food demands if it is local maize.

Therefore, it is possible to say with great confidence that the households within this class have fulfilled at least their minimum goal. The same approach can be repeated for all the classes and the result will be the same. The achievement of all the households allows us to choose between hybrid and local maize. In spite of this fact, the households of group size 19-21 persons barely satisfy their domestic food demands. In any case, it is feasible to say that the inhabitants of Chepareria have established without any doubt at least a viable subsistence economy through introduction of a mixed economy system.

On the contrary, it has been mentioned in many places in this study that Kongolai is more rich in livestock resources than Chepareria and the majority of the households, that is 65.6 %, are local maize producers.

In the same way as in Chepareria, here as well the graphic illustration indicates the households of smaller size, 1-3 individuals per household can subsist on livestock resource products without an additional need of a cultivated product(s). In spite of this fact, more than

80 % of the same group of households are cultivating nearly an average of 2 acres, pointing at a surplus production. All in all, except households of group size 13-15 individuals per household which have limited livestock resources, providing around 29 % of the required food, all the others have a capacity of more than 50 % to supply the domestic food needs from the available livestock resources.

Applying the same approach used earlier for Chepareria, it is easy to find out that it is only the households of group size 13-15 that have limited choice. Unfortunately, these households' achievement in both livestock and crop production is so low that it is hard to conclude whether their production level is above the margin of subsistence or not. For the average cultivated land is 2.2 acres, which means, if they have allotted it to hybrid maize, its yield is 106 % of the household's food requirements. The addition of 29 % of food supply from the livestock resources will certainly keep them on the safe side. On the contrary, if local maize has been sown, its yield is barely 53 % of the requirements, indicating that these specific households' capacity of production is at the stage of endangering the lives of their families, if the present level of production is not supplemented by other sources of income.

However, since these households constitute only 8 % of the total households, it still does not refute the argument that the inhabitants of Kongolai have a type of production that assures the subsistence needs from raising livestock and farming crops. On the other hand, since they are depending substantially on the livestock resource which is a highly fluid resource, their survival must have been threatened more frequently than those families in Chepareria.

On the whole, from the graphic illustration it is patent to say the prevalence of more pastoral nomadic characteristics in Kongolai than in Chepareria from the view point of their manner of resource allocation.

Conclusion

Summing up, it is reasonable to say that the issue raised in chapter 6 has been answered in this section, that is, the sub-regional spaces which have reduced their livestock gradually over time, have compensated food production by investing in crop cultivation with the growth of human

population. In general, the people of these two sub-regions of West Pokot have at least the possibility to produce their basic food demands.

Yet, the assertion as to whether these circumstances can be improved or not in the foreseeable future still cannot be made at this moment. In the preceding section on livestock resources, for example, the estimation suggested a slight increase in livestock from 1978 to 1979. But, is this change a concomitant of new techniques of herding and husbandry? Or is it simply an indication of further soil erosion? Are there sufficient incentives such as market organization, infrastructures, state policies etc... which encourage an appropriate land-use system. These factors constitute the themes of the discussion in the coming chapter.

9 THE AGRO-PASTORAL NOMADIC MANAGEMENT SYSTEM AND LAND TENURE

SOME CHARACTERISTICS OF AGRO-PASTORAL NOMADISM

In the preceding chapter, I have tried to provide an analysis of depth on the basic resources (human, livestock and land resources) as a separate element, and finally, it was presented in a general manner how the people organize the resources and form an entity of the activities system. Yet, in the analysis of the issues on how the individual or group of producers manage their activities, aspire to improve their conditions, and how the various opportunities and constraints affect their operations today and most likely will in the near future, are more or less untouched. It is the endeavour of this chapter to highlight these issues.

The initial task, therefore, is to avoid the diverse pitfalls that are common causes of a misconception of pastoral nomadism or agro-pastoral nomadism. In order to illustrate this, I shall start the discussion by referring to one of the valuable contributions on this subject, that is, Haaland's (1977) conceptual framework. Thereby, his various generalizations on pastoral nomadism or agro-pastoral nomadism were made. He argued that there are basic differences between pastoral nomadic (livestock) and agricultural (crops) systems of production and separated the two systems as follows:

PASTORAL NOMADISM

- 1.The perishable characteristic of herd makes saving and investment of herd a necessity
- 2.This investment does not require any economic institutions since one of the main products of the herds is lambs, calves etc..

CROP FARMING

- 1.Land is not perishable
- 2.Land is not consumable product unless it is converted by economic institutions to food products
- 3.Land cannot be increased by investment of its products except through economic institutions.

(Haaland, G. 1977:180)

The misconception is clear particularly for a human geographer who argues that all human activities are undertaken not in a limbo, but in a spatial room. Haaland, although his illustration suggests the existence of communal pasture (1977:180), in his analytical framework the feature of pastoral nomadism is described as if land is not a key resource which determines output and welfare of the domestic animals as noted above.

In contrast, it is said, "as with all agriculture, land is the fixed 'scarce resource' of the pastoral system" (Hopcraft 1980:3). Therefore, I also believe that land as a resource is equally as important for pastoral nomadic production as it is for crop production. The difference is simply in the qualitative uses of land. For example, crop farming is an activity which produces more food per unit area and as a superior means of production, it is relatively a task which demands more labour (human-time) per unit area than pastoral nomadism. This means that man-control is greater.

Haaland, should actually have compared seeds and livestock rather than land and livestock and the differences between his depicted features would not have been as significant as he intended us to believe. For instance, both seeds and livestock are perishable and can be increased by investment of their product e.g. seeds or young plants versus lambs, calves etc... and finally, the economic institutions are important for both, unless we conceive the herds under pastoral nomadism as wild herds. Such reasoning is obviously erroneous in my view.

In spite of this fact, it is reasonable to say that crop farming is more susceptible to marketing than pastoral nomadism. The main reason behind this is attached to the behaviour of spatial occupation while undertaking the given activity over time in a specific location. A cultivated crop(s), for instance, occupies a unit land during the major part of the annual cycle. The crop(s) cannot occupy different spatial room during the growth period. Furthermore, since each plot is handled with great care by the human agent, manpower transfers the seeds into consumable and saleable goods, there is always a tendency not to relinquish one's holding after one cycle of production. It is often used for the consecutive year depending on the know-how at the command of the producers. On the other hand, the livestock of pastoral nomads' duration in a given spatial room is short and generally scattered in space and time dimension because of the mobile nature

of the herds (see fig 1.3a).

Therefore, the longer the duration of a given activity in a specific geographical location, likewise crop farming, its production system requires more inputs that can partly be provided locally by the producers e.g. human-labour, seeds etc... and partly from outside e.g. tools... At a higher stage of development, inputs such as fertilizers, credits, advice from extension agents etc... would be required so as to control the decline of land fertility as further land exploitation proceeds over time. In other words, since land under crop production is more productive per unit area and requires spatial interdependency between other areas than land under pastoral nomadism, it takes precedence in its need of marketing organizations.

However, the moment that both systems of production are constrained by new rules of land ownership and scarcity of land resources as the population increases, marketing institutions are of paramount importance for both systems of production because duration in each spatial room will be prolonged even under pastoral nomadism. Without technical innovations and introduction of further new inputs, the inadequacy of each production to establish a viable economic life will soon be realized in the form of reduction in yields of crops or scarcity of pasture and erosion.

All in all, the omission of land as the cardinal means of production will certainly have repercussions in policy formulation and planning. The magnitude of the repercussions will be even greater if the issue pays attention to agro-pastoral nomadic people. The competition for labour will automatically limit the number of spatial rooms that can be occupied over the annual cycle, even when the land is theoretically an abundant and free resource.

In this study, therefore, land resources is regarded as a key factor of production for both systems. If there is an element to be questioned, it has to be the way in which it is used or how it is arranged with other inputs to yield a given output. The other topic of interest is to examine the different constraints that crop up while running the two sorts of production side by side.

In typical agro-pastoral nomadic sub-regions like Chepareria and Kongolai, each socio-economic unit (an extended or a single household) has a multitude of choices in arranging resources and organizing in sequence the various operations of the two activities as an entity system, depending on constraints such as domain or tenure system, internal farm organization and existing structure of incen-

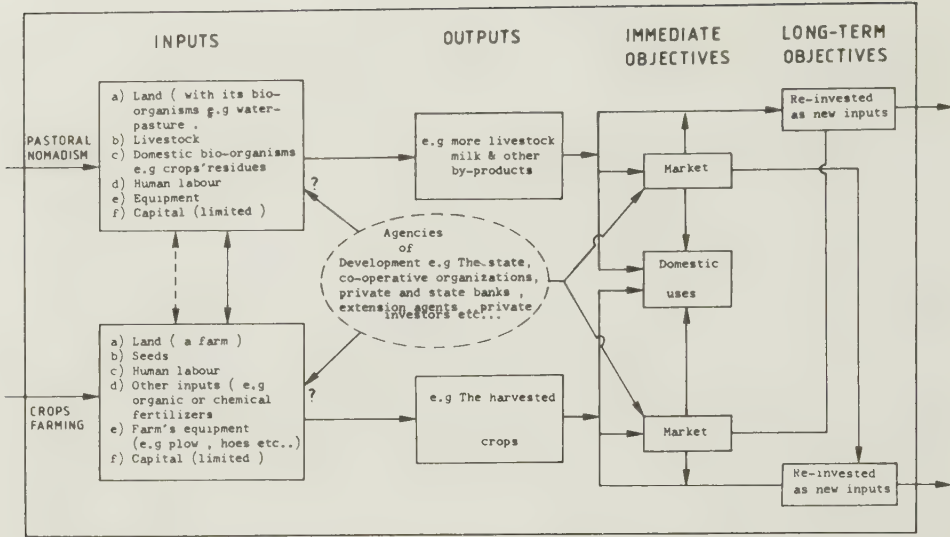
tives. To illustrate some of the implications of these constraints, an individual producer on his private land in Chepareria, may allocate a third of his land for cultivation and leave the two thirds as pasture land for his livestock. He may plough his land with the hoe and cultivate two crops by investing most of his household manpower in this. But, simultaneously, he may rearrange his livestock by type that can be herded as one unit e.g. cattle and sheep or simply cattle and he may leave them under the care of his young son and daughter so they herd them in the proximity of his farm. However, his neighbour may be a cooperative member who receives a loan from his society. As a result, he may use an ox-plough, apply chemical and local fertilizers and his harvest may consist of both cash and subsistence crops. At the same time, all his children may spend their time at school, while his livestock may be left under the supervision of hired labourers giving ample opportunity to exploit the pasture which is available on his farm as well as on public land.

On the other hand, an individual or group producer(s) within the group ranch of Kongolai may invest most of his labour on livestock rearing and may raise all types of livestock acceptable to the existing bio-ecological environment. The herding activity may consist of two units, cattle and small stock entailing more labour and different husbandry operations. Alongside, livestock raising, since land is a free and abundant resource within the group ranch, the producer(s) may cultivate crops applying a primitive agricultural technique such as the long forest or bush fallow system which means "an easy system yielding a good crop with little input of labour" (Boserup 1965:29).

I could go on describing the variety of methods of livestock and food crop productions, but it is more than enough to indicate that there is no fixed technique of production nowadays.

The agro-pastoral nomadic management system described in figure 1.9 is a true simplification of reality which shows the features that can be the causes of the variety of management systems.

If we assume that the organization of resources and operations of the two sub-systems in the annual cycle has led to a successful harvest as shown in the diagram, it is an ideal strategy to allocate each output into immediate and long term objectives. The immediate objective may require allocation again into consumable and marketed products. Whereas the long term objective infers the part



* Recent studies on rangelands and pasture suggest that there is no natural or wild bio-organisms (pasture) anymore . The existing pasture is regarded as an artificial and man-made through the uses of fire (e.g Cf. P.L.Raikes 1981 : 44-50) .

Fig.1.9. A scheme of an agro-pastoral nomadic management system.

of the output which is saved and reinvested for the future operations.

The diagram suggests also that income earned from marketed products, could be again reallocated for domestic use or may be reinvested as a new input within its sector or in the other case e.g. a household which sold many stock may buy calves as new inputs or may buy fertilizer or new tools which will be used for the coming agricultural production.

Furthermore, the development agents are supposed to play crucial roles both in directly encouraging the allocation of resources and performances at the farm-gate or in creating a conducive marketing system so as to promote a sectoral interlinkage between the producers and consumers.

However, the annual outcome may not lead to a successful harvest as it is assumed. In such circumstances, there is a risk of achieving part of the intended goal or not succeeding at all. The failure of rainfall may automatically affect cropping, but its effect on livestock rearing

will undoubtedly be gradual. Thus, a given socio-economic unit may manage to survive on livestock resources or may transfer a few of the stock through the accessible market institution so as to buy the crop(s) which are essential for domestic use. One could also not rule out a prolonged draught that may even question their survival.

Often, it is this latter climatic risk which is stressed in many studies of the marginal areas, but the contemporary man-made milieu is more or less neglected. In other words, the producers are facing not only the risk of bad weather, but as well fluctuation in producers' prices or rises in prices of purchased inputs, a delay of seasonal credits, supply of seeds, inaccurate information on marketing etc... This means there is also a high probability of losing one's working capital which has diverse effects on performance in the next cycle of production. To what extent, then, has the contemporary man-made milieu minimized the traditional climatic risk or has it increased the risks more than in the past?

In short, a profound understanding of the actual circumstances of the areas studied needs further inquiry, taking as the analytical core the constraints mentioned above, that is, the rule of tenure, internal farm organization and the structure of incentives.

THE IMPACT OF LAND TENURE ON AGRO-LIVESTOCK PERFORMANCES

It is stated in an earlier section that there are four types of land holders in Chepareria and Kongolai; a) private land owners b) families within trust land c) group ranch d) landless families.. It seems that these four types land holding systems have impacts of variable magnitude on productions of livestock and crops.

Therefore, to find out objectively its implications, the distribution of livestock owned and the land cultivated by households are represented in a graph in accordance with their rules of tenure. The outcomes as can be seen in the graphic illustration (fig 2.9) contains interesting information or at least it gives hints which encourage further analysis.

In terms of figure 2.9a, it is evident that those individual households which own their land, have invested more in crop farming than those individual households which are under trust land and those who are landless or tenants. As expected, the landless, being on other

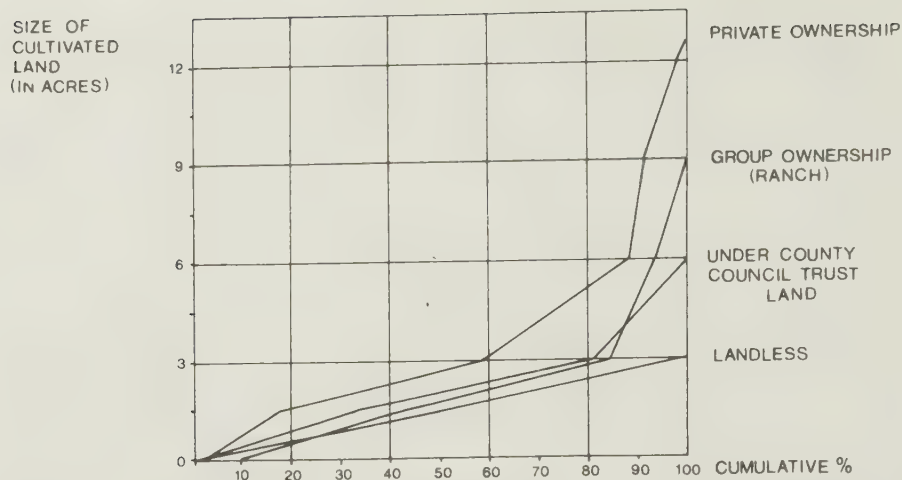


Fig.2.9a indicates the performance in crop farming and rules of tenure in Chepareria and Kongolai.

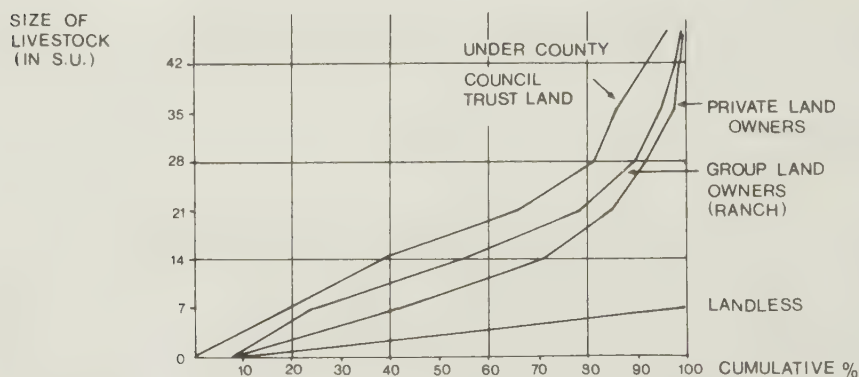


Fig.2.9b.denotes the performance in livestock rearing and rules of tenure in Chepareria and Kongolai.

families' land, cultivate very small units of land in relation to the other groups.

In contrast fig. 2.9b indicates that the households within the trust land are at the top in livestock resources compared with those on the private land, the group ranch and obviously the landless whose performance's gap is somewhat wider in contrast to the latter two.

Within the trust land, land is an abundant resource which means more spatial room for livestock movement and grazing. As the same time, they may use the most simple

system of agriculture e.g. a long-fallow shifting cultivation which requires low labour but may provide a high yield per unit land. On the contrary, land is a scarce resource in zones held privately. As a result, livestock movement and grazing is highly restricted which in turn restricts the size of livestock of each household. On the other hand, those households which have limited opportunity of increasing the livestock ought to cultivate more land and they may even be forced to further intensify their activities so as to produce more crops.

The group ranch in Kongolai is circumscribed by a fixed land domain at the aggregate level. Hence, in reality the members' performances in livestock production cannot be compared to those producers within the trust land, although their performances excel both the households on private land and the non-land owners. Therefore, with the introduction of the group ranch, new constraints were undoubtedly realized. The result is clear, a livestock output less than the past and an adoption of a primitive system of farming.

Nevertheless, there is an element in the outcome which may look odd and one may ask why the individual households did not attempt to increase the land under cultivation more than the households in the trust land, to compensate for the loss of opportunities as a result of adoption of new tenure? The most plausible answer to this question is, the set up objectives of the group ranch which only stresses the improvement of livestock rearing activities, does not at all give a prominent place to crop cultivation.

Hence, we can simply say at this point, that the part of Chepareria which is held by private land owners has increased, to a certain extent the land under cultivation, suggesting a great interest in increasing the relative productivity per unit area. Whereas in the trust land, where land is a free resource, there is a general tendency to own a large stock and less investment in crop farming. Nonetheless, the land tenure constraints obviously fall short of explaining the types of techniques in agro-livestock farming which prevail in the areas in question. In other words, the consideration of the internal farm organizations should be the next important subject for discussion.

10 INTERNAL FARM ORGANIZATION AND PERFORMANCE

INTRODUCTION

It is undisputable that the rules of land tenure have implications of great depth in any agrarian system. This has been suggested in the preceding section by clearly indicating that the different rules of land ownership have variable influences on the achievement of crop and livestock farming. Nevertheless, it has been realized that land tenure is by no means a sufficient basis of analysis to highlight fully the pattern and process of the activities undertaken by the people in question. This is because, even within a given system of land tenure, the operations may show multifarious characteristics. Therefore, a detail analysis of the organization of farms is a step further in understanding the circumstances and depicting the constraints encountered.

As a whole, the process of intensification is evident everywhere in West Pokot, albeit its vigour is variable in accordance with the different socio-economic conditions of the various regions and sub-regions. Of course, this change has easily discernable elements which can be regarded as new opportunities that have a substantial effect on the farms' organization. The opportunities are as follows:

- The reduction in investment of human-time (or labour) from spatial mobility with herd.
- The minimization or total elimination of raiding which means again less human-time on herding activities.
- Accessibility to better information on one's bio-environment constraints e.g. condition of water-pasture stations, diseases etc...

These opportunities most certainly allow the farmers to organize and order all resources which concern livestock raising in relatively better manner and in addition, surplus labour can be made available for other activities.

Unfortunately, the enjoyment of these new opportunities has its own sine qua non requirements and these are:

- Better herding and husbandry techniques would automatically be imperative. Otherwise, the deterioration of the bio-ecological niche would certainly follow.
- More association with external factors such as market institutions, governmental and private agencies of development which means accepting new constraints and riskier farm enterprises.
- A need of reallocation of the human-labour gained to new activities e.g. crop farming or non-agricultural employment or both.

Therefore, I will come to consider properly the quality of the actions and constraints of the people in question during this transitional period.

ORGANIZATION OF AGRO-PASTORAL LAND-USE SYSTEM

An agro-pastoral nomadic land-use is not a unique development path noticed only in West Pokot as discussed in different parts of this study. In the tropical savanna countries, a combination of animal rearing and slash and burn technique of crop farming, on the whole is an old phenomenon. The slash and burn technique, a characteristic usually associated with long shifting agriculture converts the forest and bush zone, which is often infested with Tsetse-fly and other insects, into grazing land (Ruthenberg:1980). Thus by keeping livestock, the fallow land is never converted again either to forest or to a dense bush land. In effect, it allows each socio-economic unit engaged in these activities to reduce the human time (labour) required for land preparation (Johnson 1958:136) and also eliminates the risk for "Trypanosomiasis".

To a large extent, it is the availability of abundant land under fallow and its requirement of much low manpower for pursuing shifting cultivation which makes it a complementary activity to pastoral nomadism. Particularly, it has a minimum negative effect on the other activity, if a clear division of labour by sex is practiced (Ruthenberg 1980).

The traditional pastoral nomadism in W. Pokot as extensive livestock rearing required a continuous labour allocation throughout the annual cycle. But, this does not necessarily imply that there is no peak labour season. Actually, one of the most emphasized elements in pastoral

nomadic literature is the pronounced labour peak in the dry season. The difficulty faced by the traditional Pokot in the dry season was clearly also indicated by Schneider (1953:195).

In fact, the increase in labour input in the dry season is not simply due to the frequency of watering livestock but as well to the need for change in the ways of herding. For instance, when the scarcity of pasture is realized after the consumption of palatable feed in the wet season, the woodgrowth and leaves of the trees become the vital browsed biotic food for the livestock in the dry season. Usually, the location of this biotic food-web is not distributed uniformly in space. In other words, the simultaneous presence of the livestock and the biotic food should be coordinated both in space and time. Such an undertaking in turn requires long journeys between biotic food stations and may need division of livestock in order to cater for their preferences in biotic food types so as to entirely exhaust the existing natural potential, unless the biotic food is harvested and then transported to the area where the livestock are located.

In addition, since crop residue is highly valued as a supplementary food for livestock, after exhausting one's cultivated land, occasionally the livestock may be driven to different neighbouring harvested fields. Such practice is allowed particularly by those who have small stock of their own and who are aware of the contribution of the animals' droppings as a means of soil fertilizer. Speaking on the Fulani agro-pastoral nomadic people of northern Nigeria, van Raay (1975) noted the same behaviour, that is, the cooperation between agro-pastoral nomadic farmers and even between settled crop farmers and pastoral nomads for such an opportunity. Thus, a strict herding activity which drains a substantial amount of human labour is of paramount importance in this specific season.

In contrast, a more passive herding activity is pursued in the wet season, although most of the husbandry activity is undertaken alongside e.g. calving, castrating, breeding and cross-breeding, identifying stock that are going to be slaughtered, sold, milked or fallow etc... for the coming season. All these additional tasks do not necessarily involve a high consumption of human time.

In short, the labour demand for both herding and husbandry activities is much less in the wet season than in the dry season. This is mainly due to abundant biotic food resources within one's neighbourhood. Subsequently,

most of the labour force is released from pastoral nomadism. Thereby, making it available for other activities e.g. crop farming.

Thus, as long as both human and livestock populations are low vis à vis their carrying capacity (population relative to resources), the maintenance of long shifting crop cultivation and extensive livestock rearing (agro-pastoral nomadism) would undoubtedly be a viable technique for many years to come. But, this does not mean that the fertility of the soil will be preserved. On the contrary, reduction in forest will lead to a decline in biological activities and less nutrients are stored in the biomass and there will be more leaching (Porter 1970:192). In the long run, the fertility of the soil will decline unless the technique of crop farming and livestock rearing is improved. Therefore, this system should be considered as a bridge to the development of a superior and appropriate land-use system.

In any case, the systems which constitute an extensive cultivation (long fallow shifting) and extensive livestock rearing (pastoral nomadism) are doomed to collapse under the weight of a growing population, expansion of cash crops and new land policies which somehow fix the size of land resources. Vermeer remarked on the weakness of shifting cultivation as follows:

"Shifting agriculture, as a land extensive agricultural practice... presumes sufficient land that can, upon demand, be incorporated into the system. A group practicing shifting agriculture has traditionally maintained the effective functioning of the system and its own self-sufficiency by absorbing land unused and within the control of the group, and by taking adjacent tracts outside its domain. Ample land is essential to accomodate increasing population and to permit a fallow or rest period that forms a component part of the land use cycle; and the fallow period must be sufficiently long to re-establish soil fertility for another cycle of use. However, when additional land is no longer available for incorporation into the system, the fallow period length is reduced, soil fertility decreases, crops' yield drop during the cultivation portion of the cycle and the whole system is in jeopardy" (1970:299).

It would not be very difficult, therefore, to imagine

the circumstances if this agricultural technique was undertaken along the lines of extensive livestock rearing as part of the land-use system.

Usually, the collapse of the long shifting cultivation and extensive livestock rearing economy is followed at least by a relatively intensive crop cultivation. This is mainly because the problem of maintaining the fertility of the soil is a central issue in increasing the productivity of a unit land. As a result, crop farming techniques such as mixed cropping, crop rotation and spacing of works, so as to spread the labour of planting both in time and space becomes more diffused and elaborately developed among a given people. These techniques clearly suggest a relative intensity of production per unit land limiting at the same time the encroachment of cropping on the fallow land.

Furthermore, it allows further reduction of labour (human-time) needed for weeding and also permits the different crops to take advantage of all type of soils prevailing in a given area (Morgan 1969:255).

Some of the producers may also begin to introduce new tools e.g. the ox-plough may replace the hoe. This is due partly to the condition of the soil and partly to maintain the long fallow system as long as possible (Boserup 1965:48).

In a sense, it is the impetus of intensification which leads to diversification, crop rotation, work spacing and even towards a consciousness of fertilizing and conserving soil.

At this moment, it would be reasonable to say that these techniques themselves, indirectly indicate the formation of competitive conditions for human labour between the various farming operations. They most likely conflict between crop farming and pastoral nomadism in term of manpower as well as in land resources, particularly in areas where a modern land tenure system is in operation.

To highlight these circumstances in the areas studied, a seasonal rhythm of the major activities, that is, livestock rearing and crop farming are presented in figure 1.10 which elucidates how they combine and arrange them in sequence the various operations of the agro-pastoral nomadic activities in the annual cycle.

A quick glance at the illustration, for example shows distinctly that most of the farming tasks are concentrated to the wet season and the fallow period is predominately in the dry season. Which means to say that the producers

attempt to minimize labour costs by adopting the activities that complement each other in time so that the labour valley of pastoral nomadism is filled with the labour peaks of the farming operations and vice versa. There are other tasks which are excluded in the illustration e.g. improvement of farmland such as fences and house building, brewing, engagement in handicrafts. In other words, there are a few individuals who allocate their time to non-agricultural activities. Nevertheless, we can be certain, what it is presented in figure 1.10 provides enlightenment on the most important constraints and opportunities which can crop up during the process of combining and ordering the different operations of the two major activities in the areas studied.

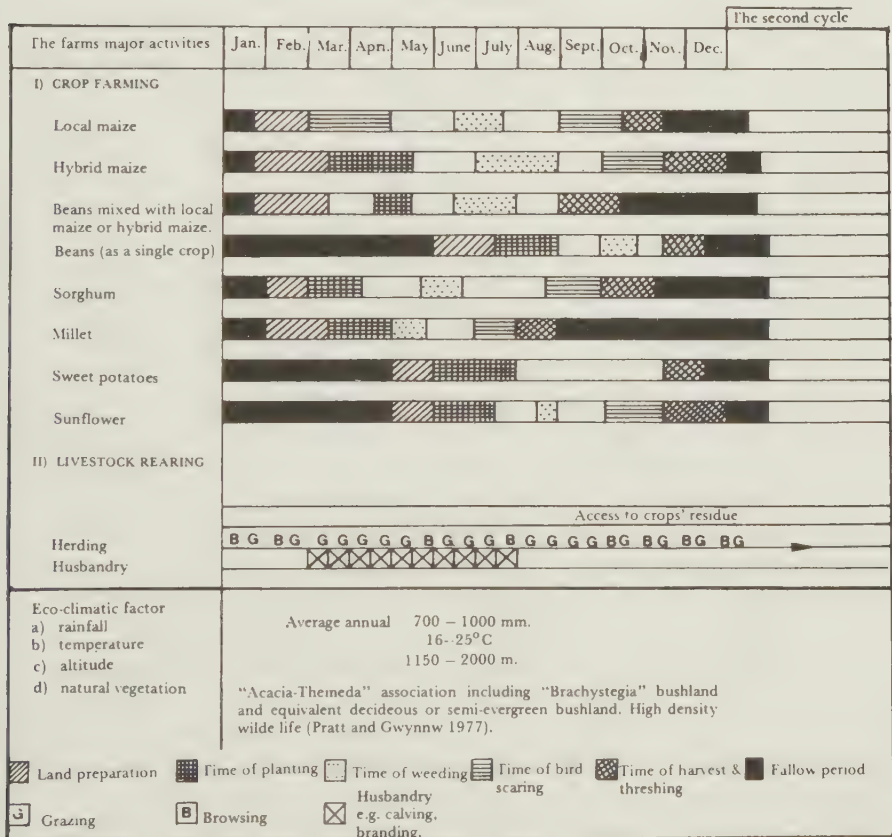


Fig.1.10. Seasonal rhythm in crop farming, herding and husbandry, particularly of Chepareria (source the field survey of 1979 and M.o.A, West Pokot District Land Development Division Standardized Guidelines 1980:17).

TIME AND SEQUENCES OF AGRO-LIVESTOCK OPERATIONS

Generally speaking, the prevailing technology of the people in question is at a low stage. The set of techniques employed is merely a means to gain the basic sustenance from its environment. But, its role in facilitating the organization of resources and prompting rapid environmental change is limited e.g. absence of irrigation systems, low mechanization, the lack of adequate transportation and storing facilities etc... For example as shown in fig. 1.10 ploughing is undertaken about the beginning of February, particularly for certain draught resistant crops such as local maize or sorghum. In any case, most of the producers consider it a good practice to complete the ploughing or hoeing task before the coming of the small rain which is usually any time between March and April.

However, the condition of the soil may not make it possible to accomplish this unless tractors are available, for the land is too dry. Such an expensive venture is not accessible to the majority of the smallholders, although a few households occasionally rent tractors. The most diffused tools are hoes and ploughs. Consequently, it is often not possible to plough until after the first shower of the small rain. Hence, the tasks of ploughing and planting shifts in accordance with the early break or delay of the small rain, implies as well the difficulty to coordinate the tasks with the best pre-set planting time in the dimension of the annual cycle. Instead, we observe in figure 1.10 each task usually being of long duration so as to allow each producer to react to the early break or delay of the small rain. Obviously, this manner of operation has divers drawbacks on cost of labour, organization and even on the yield of cultivated crops.

Particularly, the consideration of the yield of crops is of paramount importance because the coincidence of the early rain and time of planting is one of the cardinal factors which affects tremendously the annual output. For instance, considering the time of the planting of hybrid maize in Kenya in relation to time of rain, between hybrid maize sown in early rain and 28 days after, there was a yield ratio difference of 1.5:1 (Harrison Cimmyt 1968:105). Thus, it demonstrates the need for introduction of an appropriate technology which facilitates the supply of water in such marginal areas e.g. an irrigation system.

Another factor which affects the yield, is the way

in which weeding is undertaken. After an interval of three to four weeks from the time of planting, most of the members of a family are occupied in weeding. Sometimes, a given plot of crop may be weeded twice or three times. Strictly speaking, the demands for human labour vary depending on the prevailing technique of cultivation e.g. weeding is not so significant for those practicing long shifting cultivation. Whereas, in the areas where land is scarce and a higher degree of intensification is evident, such as the privately held part of Chepareria, elaborate weeding is one of the essential tasks which guarantees a higher yield.

On the whole, weeding of hybrid or local maize can be a back-breaking toil which demands the mobilization of most of the members of a family and even outside help may occasionally be required. The weeding tasks of the various crops enumerated in figure 1.10 may extend from late May to the beginning of September following the planting time of each crop.

Finally, harvesting and processing operations are in general labour consuming tasks which stand in conflict with pastoral nomadic activity. This is because the herding task would begin to require more and more human labour from the harvesting period onwards. However, its constraint on livestock rearing, is often minimized or neutralized because plenty of crop residue can be made available as supplementary fodder crops in addition to the pasture accessible around a given holding as the harvesting of crops proceeds.

Evidently, the adopted technique of crop cultivation and pastoral nomadic system imposes a strict physical limitation on the amount of land that can be cultivated and the number of livestock that can be reared in the annual cycle. Perhaps, like the Pokot of the fifties, if one specific crop is cultivated in a land of less than one acre, based on long fallow shifting cultivation system and on a strict labour division by sex, the effect of one of the sub-activities on the other will most certainly be minimal (Schneider 1953:154). On the other hand, the competition between crop farming and livestock raising for land and labour resources will be a crucial issue if land is made a scarce resource directly by governmental policy or indirectly by population growth.

Consequently when scarcity of land resources is realized, neither long fallow shifting cultivation nor division of labour on sex basis can be applicable. Vermeer indicated

this trend among the Tev people (1970:314) and the Pokot people as well ought to modify the pattern and process of operations of the various activities pursued in an annual cycle. Hence, I shall attempt to show the degree of population pressure within the agro-pastoral nomadic people of the areas studied in a more detailed way and then examine whether the existing different processes of stock-rearing and crop farming systems can be explained based on different vigours of population pressure.

AGRO-LIVESTOCK PRODUCERS AND POPULATION PRESSURE

Earlier, I have discussed exhaustively how a population density which has reached its critical level adopt multitudinous techniques of undertaking activities so as to enable the given area to absorb more population through increasing output per unit area, although such a change is at the expense of a decline of output per capita or per man-hour. Generally speaking, a human population in its crudest value is concentrated usually where easily exploitable resources are available and in conditions where such opportunities are absent it is sparsely populated. However, I have also noted elsewhere that neither a dense nor sparsely populated physical space reveal whether the population is excessive or not vis à vis resources. On this point, there is a general consensus among geographers (Akerman 1969, Gupta 1970, Hance 1968) to mention a few out of many, that crude density is not a scientific index for measurement of crowding.

Commenting further on human population pressure, Hance, for instance said "Rarely does anyone suggest that densities of 10 or one or even less per square mile may lead to as great or greater pressure on the land as those of 500 to 1000 and more per square mile in favoured areas... There is also the reverse fallacy that all areas with high densities suffer from population pressure (1968:8).

In other words, an area with high crude density may have still the capacity to absorb more population without requiring a major technical change of organizational and operational set up of the existing activity(ies) or an area with low crude density may suffer from excessive population in terms of resources, that is, it will be a necessity for the people to acquire a new technology to change the ratio of human population and environmental resources.

Basing his argument on the fact that population can exert its pressure at different level of population size and in variable eco-climatic zones, Brookfield argues as follows:

"...it is possible to sustain cultivation by very simple means over long periods, under moderate population densities, and even quite high densities where conditions are usually good. Thus, for example, we find large numbers supported by very simple forms of cultivations on some recent volcanic soils in parts of pacific. Where constraints are more severe, it remains possible to support very low densities of population by simple means, but rising densities demand a measure of intensification of land is to continue in production, and the ecosystem be not destroyed. Constraints of high order present occupiers with no alternative but to adopt some special technique, even at a low population density" (Brookfield 1972:42).

Simple changes in techniques have been recorded in the past in areas of low crude densities but of excessive human population relative to its carrying capacity.

Nevertheless, such areas do not fully enjoy the opportunities which are fully exploited in areas of high crude densities, at least at the initial stage of intensification. That is, the possibility to substitute abundant labour resources for scarce natural resources, and the peoples' capacity to share the burden of collective investment, (points often stressed by Boserup 1965, 1981), in relation to area of high crude densities, is very limited. Which means to say, whenever a simple change of technique of operation is adopted as a response to the impetus of population pressure, a relatively better production will be sustained for a short while and then its vigour will begin to decline, demanding again a superior technique and better organization of resources. This is mainly because, since the area is marginal, to improve the prevailing scarce natural resources, that is to make it super-marginal, substantial resources (new inputs) are required as a substitution for scarce and low quality natural resources which are in the process of being mined. Usually, these means cannot be generated internally except in areas which are rich in mineral resources e.g. oil.

Then, if there is a desire to improve the quality of life of the people in question, and to avoid destruction

of natural resources, starvation and mass migration of people, resources for net capital formation should be generated exogenously to the production process. This could be done by, favourable marketing conditions for outputs and inputs, a consciously planned governmental programme of capital investment on transportation means, irrigation, cooperative organizations and encouragement of private investment through a conducive tax policy. These methods could undoubtedly be a panacea to this problem and most certainly would change the ratio of human population to environment resources, opening new opportunities for the surplus population.

In any case, what is made clear is that simple density may give a wrong picture of population pressure, and this can be corrected by considering the whole technical socio-ecological environment from a dynamic perspective. In other words, the rate of population growth, its distribution on the geographical space, the imbalance in relationship between human population and resources, merit further scrutiny as they are of fundamental importance for understanding the present trends of development in the areas studied.

As a result of this finding, I have first determined in chapter 6 that the areas surveyed are under human pressure basing the argument solely on the estimation presented by Pratt and Gwynne (1977) which sets the limit that a people pursuing a pastoral nomadic way of life in eco-climatic zone IV should be not more than seven persons per square kilometre. This estimation should not be misunderstood. It is not a crude density, actually it is a result of a consideration of many factors such as the activity of the given people, the potential of bio-ecological resources, the food requirement of the human and livestock population (see page 75).

Surprisingly enough, we know today that the same people have shifted more and more to agro-pastoral nomadic ways of life and even a few individuals can be said to be on the verge of establishing mixed farms, indicating on the whole that land is ameliorated by adopting a relatively superior land-use technique. Consequently, it is feasible to say that the areas studied have a higher potential to absorb more human population. In a sense, the census of 1969 and 1979, which indicate the crude densities of Kipkomo (Chepareria) location and Riwa (Kongolai) location as 17 and 31 persons per sq/km. and 13 and 20 persons per sq/km. respectively, at least suggest the formation

of a new technical socio-ecological system which has made possible for the growing population in question to lead at least a viable economic life. Otherwise, if they had been aspiring to lead a pastoral nomadic way of life in the strict sense as in the past, the viability of their economic life would have been already jeopardized.

Nevertheless, we should not be satisfied by taking as sufficient evidence, the changes in the crude densities between 1969 and 1979 of Kipkomo and Riwa, the locations of the areas surveyed. For, this presupposes that density over the whole specific area is uniform. If it is possible, a further endeavour to broaden our knowledge on the distribution of population pressure and to find out whether there are responses to counteract the prevailing pressure, is of great interest. But we should bear in mind that there are issues that should be raised in advance.

First of all, in the group ranch of Kongolai, the nature of settlement of its population does not allow preparation of an isolines population density map which depicts the circumstances at micro-level. This is because the entire population is clustered in thirty different locations (see fig.3.7), leaving its major land as a potential base for bio-organisms' food-webs (pasture) for their livestock.

As noted earlier, the total land of Kongolai group ranch is the adjudicated and legally defined domain of all its members. Then, the population pressure can be easily accounted for the whole adjudicated ranch. Despite this fact, the population pressure is most certainly unequally felt among the members in the absence of internal rules of land-use as mentioned earlier (see chapter 7).

As a result, the population which exerts its pressure on the total land may not be realized in the early stage, at a household level, until the conflicts between socio-economic units are highly accentuated. At this moment, the majority would not find it worthwhile to put more effort into the occupied land when each is conscious of the capacity to manipulate an additional spatial room in one's surroundings, following the traditional behaviour of land allocation.

Thus, adoption of new techniques or intensification of agriculture to improve the potential of land resources' concomitants of population pressure, is unlikely in such circumstances. An effective tenure which takes a group of individuals as unit owners, would have included as well, rules which define the series of relationships among the members of this specific group with regard to the

many uses to which land may be put.

Secondly, the scattered pattern of distribution of human population in the geographical space of Chepareria, encourages me to look for more precise information on the distribution of population pressure. Subsequently, the isolines density map (fig.2.10) was prepared. However, before furthering the interpretation on this map, the zones under "trust land" and "private ownership" were distinguished by over-imposing the tenure map over the population density map so as to indicate the quality and limitation of the prepared density map.

It seems that it will be difficult in the trust land to determine the extent of the population pressure as precisely as in the privately held zone. This is because the population spatial mobility is less restricted under the traditional tenure system. In other words, even when population exerts its pressure on the entire available land of this given people, the individual farmer would have spatial room to readjust over time his circumstance at the cost of his neighbours. This means the depicted isolines of population densities in the trust land may not indicate exactly whether the population will be maintained or will increase in the near future.

Therefore, the concept population pressure is made amorphous by the defective tenure system, although a rough estimation can be made by simply considering the distinction of the area made for the administrative purposes. Then, if the users are made to conceive land as abundant resources as a result of a defective tenure system, while in reality, it is under population pressure, is it realistic to expect the population pressure to be an impetus for further intensification or introduction of new agricultural techniques? This is doubtful.

In contrast we know that the individualization of land tenure rights highly restricts the mobility of population in space to expand their land holdings. Therefore the isolines density map, in this case, discerns precisely how the population is distributed within the privately held zone. Clearly the map provides more detailed information than the density pointed out at the location level. The central part of Chepareria, for example, has more than double the numbers of inhabitants per sq/km. than the density given for its location, Kipkomo.

Thus, it is appropriate to formulate the following question. Has this recognized trend of population pressure been accompanied by a tendency to intensify agricultural

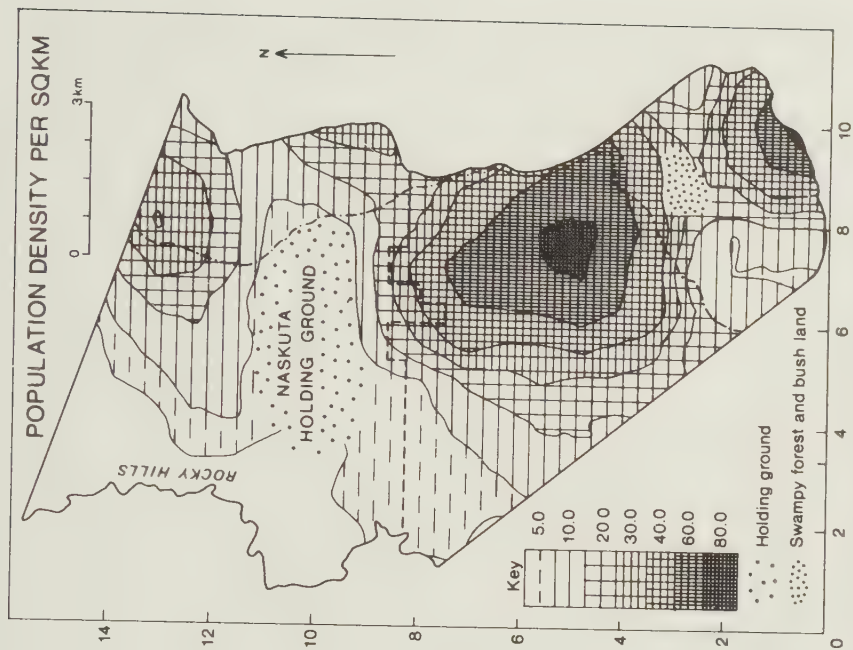
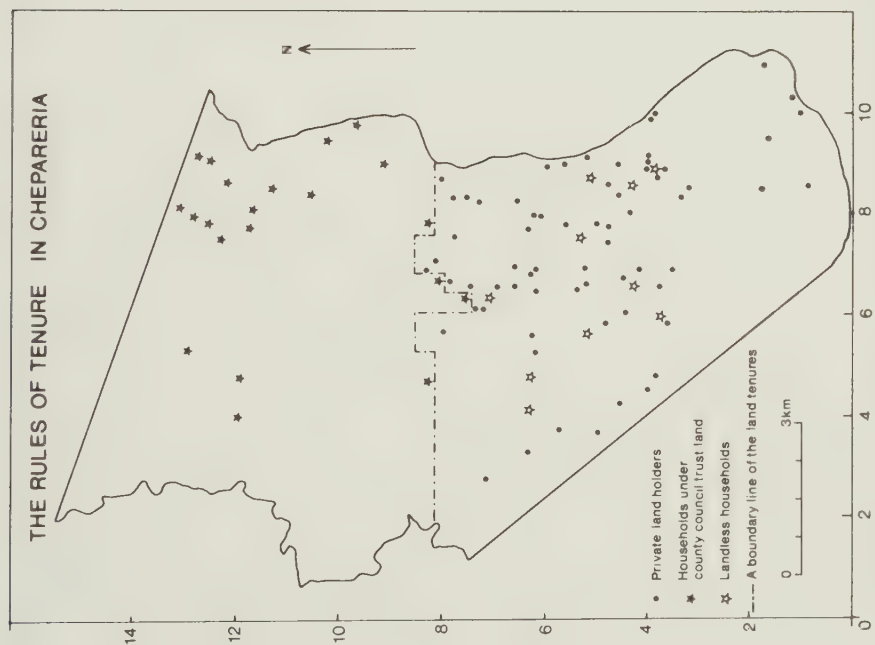


Fig.2.10. Population density within the privately owned area and trust land. N.B. As indicated earlier the interpretation of population density in the trust land should be considered with caution.

activities? Or are there some kind of counteract responses to population pressure which lead to spatial organization and operation differences in this part of Chepareria?

Let us then turn our attention to find evidence which justifies the argument on the adoption of intensification or changes in techniques of operation and organization, taking population pressure at least to begin with as a potent factor which stimulates these changes.

RESPONSES OF DIFFERENT RURAL FARMS TO POPULATION PRESSURE

As population pressure is felt in each farm of livestock-cum-crops producers, the value of land rises in relation to the labour costs as in any other agricultural area. This in turn becomes the impulse for labour intensity so that every socio-economic unit packs the various agricultural activities into whatever scarce land resource is available. Usually, it is with diversification that this feature appears in the tropics. This means to say that the essence of diversification is the initiation of the process of intensification in order to reduce the cost of physical space and to increase at the same time the output per unit area. Ruthenberg (1980:8) remarked also that the return of diversified activities is higher than those farms restricted to one or two activities. However, there are many reasons for diversification a) work spacing b) crop rotation c) fertilizer balance d) Feed balance d) self-sufficiency f) spreading risks (Andreas 1981).

At this juncture, it is worth noting that diversification can be found in a great number of farming systems, but associated with different techniques. The gradual transition for instance from pastoral nomadism "stricto sensu" to incorporation of rudimentary crop farming, which reflects a technique of forest or long bush fallow cultivation, can be regarded as diversification. Yet, such actions may simply justify the need for self-sufficiency and spreading risks. But, its relevancy in describing the process of intensification is minimal. On the other hand, work spacing, crop rotation, fertilizer or feed balance are not only indicators for diversification, but they are indicators which help us to disentangle the different agricultural techniques underlining the various operations. In a sense, in Ester Boserup's study (1965), it is the system of crop rotation and fallow system which is taken as an index of measurement of intensifi-

cation, and in association with this change, fertilizers or feed balance are discussed. Grigg (1980) also notes the different approaches to population pressure, but he assesses intensification or changes in agricultural techniques in terms of production and demographic responses. Besides, the elements pointed out by Boserup, he includes the influences of existing incentives in a given environment e.g. employment in the non-agricultural sector, the market conditions, possibility of migration and even demographic control e.g. birth control as a means of reducing the burden of population pressure and simultaneously stimulating the growth of the agricultural output. Hence, there are a variety of ways of detecting and solving the problem of population pressure in rural area according to Grigg. Let us assess them, using the synopsis of his approach to detect responses and non-responses to population pressure, in the areas studied.

Expansion of cultivated land

The various holdings in the areas studied constitute subsistence-cum-cash crops farming enterprises, but since one of the main cash crops is used as cash and as well as a food crop e.g. hybrid maize, it is difficult to distinguish explicitly the cash crop and food crop areas. On the whole, the average range of cultivated land is 1.9 - 2.2 acres per family in Kongolai, with an average of 2.4 acres and the maximum size is about 6 acres. In Chepareria, particularly in the private holdings and high population zone, crop cultivation has been expanded to a larger area e.g. cultivation of 9-12 acres is not uncommon. But the average size of cultivated land ranges from 2.7 - 3.7 acres, with an average of 3.18 acres. Therefore, as stated earlier, there is a general tendency to increase the area cultivated as much as possible nowadays, particularly if we compare the situation in the fifties. For instance, in the traditionally irrigated highland of W. Pokot, the average cultivated land was only half to one acre (Schneider 1953:154). In the lowland like Kongolai and Chepareria, cultivation were not at all regular and the size was very small.

Selection of crops

Population pressure as the potent factor influencing the producers' decisions, usually encourages them to make a careful selection of the crops they cultivate considering the crop yield, the available labour (human-time), its effects on the scarce land resource and also bearing in mind how the different operations are arranged and organized in sequence over the annual cycle.

Some of the problems posed may be illustrated through the use of the seasonal rhythm in crop farming and live-stock rearing given in figure 1.10 concerning the areas surveyed. For instance, the time of ploughing and planting operations of local or hybrid maize, sorghum and millet coincide more or less with the same range of time. Hence, it is usually uncommon strategy to conduct simultaneously the cultivation of all these crops.

In the same way, producers must select crops with tasks of cropping that fall within the wet season and complement other farming tasks. In addition, crop cultivation as a whole should fit in with their livestock rearing operations, especially if division of labour by sex is not practised. For example, the main task of hybrid or local maize cultivation is within the wet season, and this crop can be produced mixed with beans, or the ploughing and planting of beans as a single crop can be undertaken following the completion of the maize planting. Therefore, in such a society where technology is limited, arranging the different operations coherently in accordance with available manpower is one of the main constraints which affects the selection of crops. Coffee, as a cash crop has been introduced within the privately owned land of Chepareria and in an area around Kapenguria, but it was more or less rejected by the majority of producers. The main reason is said to be its requirement of relatively high labour (at least a minimum of 480 man-days labour per hectare) which should be allocated not at a particular period of the season but continuously over the annual cycle (SRDP/OP12 1975:6/1/).

In other words, all the tasks undertaken in the annual cycle should be arranged in sequence so as to avoid labour constraints at certain periods of the season. Apparently, the spacing of work seem to be one of the techniques applied particularly in Chepareria. Viewed with consideration to the facts presented in figure 1.10, the table 1.10 is an excellent illustration of the above argument.

Table 1.10 The most frequently selected crops and work spacing among the sampled households of Chepareria and Kongolai.

The selected	Chepareria		Kongolai	
	no. of household	in %	no. of household	in %
Hybrid maize	12	11.7	7	10.9
Hbrid m. X beans	40	38.4	3	4.7
Hybrid m. X beans + sunflower	3	2.9	-	-
Hybrid m. X beans . Sweet pota.	2	1.9	-	-
Hybrid m. + beans	-	-	2	3.1
Local maize	6	5.8	34	53.1
Local maize X beans	13	12.6	5	7.8
Local maize + beans	2	1.9	-	-
	78	75.6	51	79.6

Source: The field survey of 1979.

X intercultivated

+ cultivated in addition as a single crop

It is evident from the table that 76 and 80 per cent of the households of Chepareria and Kongolai respectively, select a crop or crops which fall within the various combinations indicated in the table, clearly showing their pattern or work spacing to avoid constraints of manpower.

The few remaining households not included in the above table are assumed to have most likely access to sufficient labour (human-time) which allows them to run the various operations simultaneously. Besides, it should be understood that there are wealthy agro-pastoral nomads in these sub-regions. Since title deeds, durable properties and savings are the most commonly accepted securities, they are the first qualified individuals for governmental or private bank loans. It is not far from the truth to say that they are the first who usually enjoy the fruits of innovations and governmental services. In other words, for such individual households, there is no such bottleneck which affects both their cultivation and livestock rearing activities.

In any case, the spacing of work as suggested in the above table is more pertinent to Chepareria than Kongolai because 53 per cent of the households in Kongolai are

Table 2.10 Indices of selected crop cultivators in Chepareria and Kongolai. (The non-growers= 100)

crops of producers	Chepareria	Kongolai
All hybrid maize producers	164	33
Hybrid maize planted in pure stand	14	12
Hybrid maize intermixed with beans	98	7
Local maize in pure stand	13	156
Local maize intermixed with beans	30	8
All local maize producers	56	190
All bean producers	312	26

Source: The field survey of 1979

still producers of local maize in pure stand, a draught resistant and a minimum labour demanding crop. Of course such rudimentary crop farming practice is concomitant with an extensive livestock rearing operation e.g. pastoral nomadism.

In contrast, the on-going relatively intensive agricultural activities in Chepareria are somehow pointed out clearly. In addition, to the highly evident diffusion of diversification, work spacing, we can also note that the traditional low yield crops e.g. local maize, millet or sorghum seem to be replaced by high yield crops such as hybrid maize, and other types of cash crops. Particularly, the frequent cultivation of leguminous crops mixed with maize or as a single crop, indicates not only the great interest in crop yield or output per unit land, but also the interest in conservation of soil fertility (see table 2.10).

In view of its spatial distribution, the selection of high yield crops and other cash crops versus the traditional crops is spatially differentiated more or less following the circumstances of population, density and the types of land tenure (see fig.3.10).

The densely populated part of Chepareria, where private

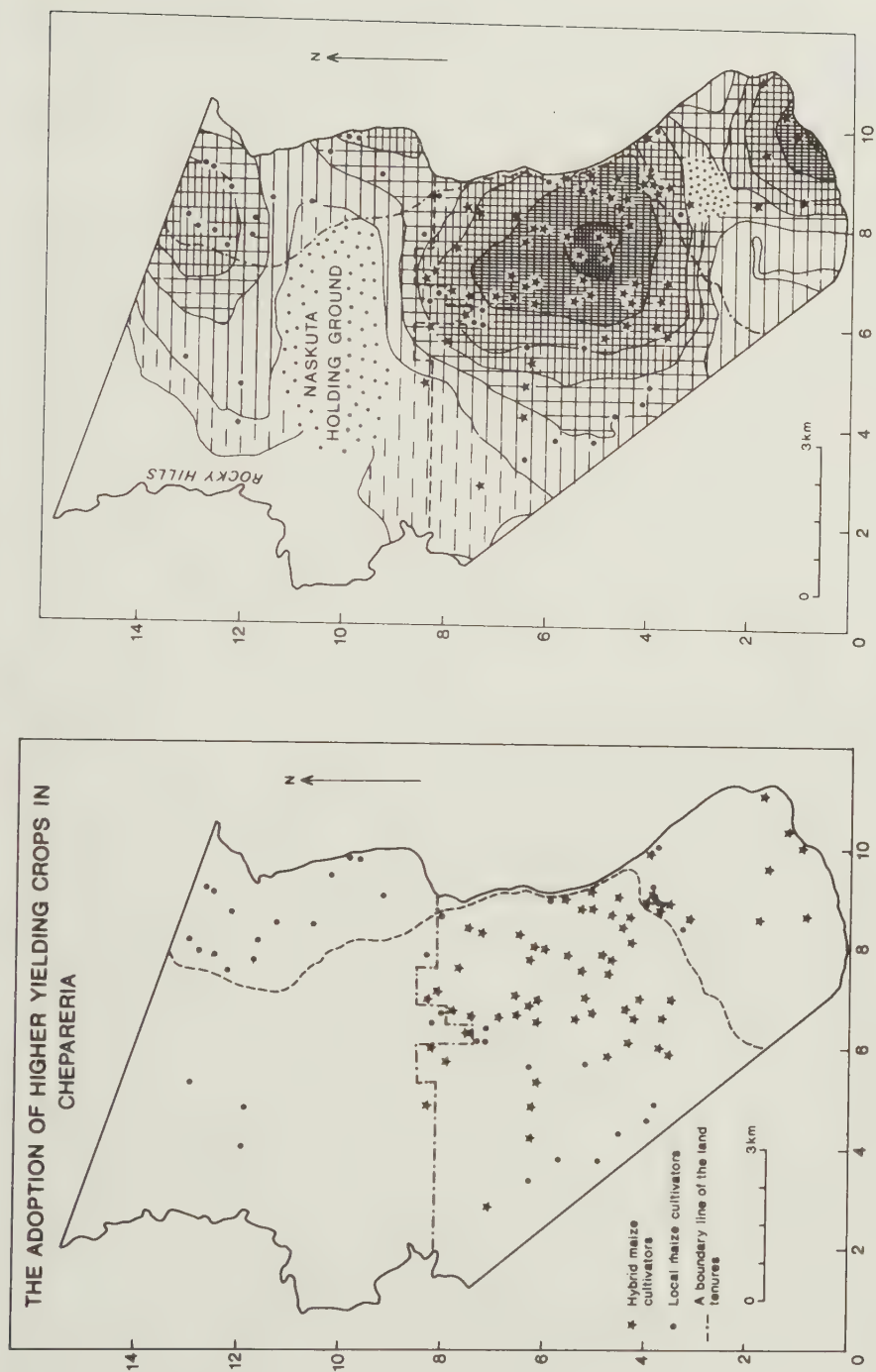


Fig.3.10. The adoption of higher-yielding crops and population pressure.

land ownership prevails, is almost totally dominated by hybrid maize, beans and other cash crops because the producers of hybrid maize are also the main bean producers and only other cash crop cultivators (see table 1.10 and 2.10). Whereas, the part of Chepareria under trust land is almost totally a home for local maize, millet etc...

Therefore, the high diversification, high yield crops, leguminous crop productions strengthen the fact that the population pressure and the system of tenure have clearly influenced farm organization in different ways and has given a different spatial characteristic to Chepareria, particularly to the privately held zone.

Crop rotation and fallow system

Generally speaking, when the growth of land shortage is felt in any tropical region, the first trend often recorded is the shift to crop rotation on a single plot of land so as to reduce the fallow land and to maintain or improve the productive capacity of a given unit of land. In effect, those crops that reduce the fertility of soil are followed by those that greatly enrich the soil e.g. leguminous crops such as peas, beans, potatoes, cultivated grass etc... In such a way, they shorten the fallow period without endangering the productivity of a given land, at least for a limited time. In short, the temporal ordering in sequence of the different crops is a conscious method of maintaining or improving the productivity of a given plot of land. That is why it is considered as a response to population pressure or a technique of land intensification.

The essence of shortening the fallow land suggests also the great interest in planting crops on all the potential arable land, thus reducing part of the hitherto grazing land in the main settlement zone. In such circumstances, shortage of biotic food for livestock undoubtedly emerges, if the people in question are at the same time raising a substantial number of livestock. Nonetheless, this constraint appears or is realized by the producers, if they have a clearly defined land tenure system which fixes not only the total territory of a group of individuals but also determines how each member shares the available potential land resource. In other words, a population pressure associated at least to discernable internal administrative rules of land-use that are strictly followed

by all the members, will certainly encourage crop rotation and shortening of fallow and most likely the reduction of stock may begin. If the market conditions allow, even fodder production may be realized in the near future. However, the absence of such rules of tenure will delay the adoption of new agricultural techniques and there will be, on the contrary, the tendency to maintain a large number of livestock which correlates to the existing human population, albeit human and livestock populations do not balance existing potential resources.

In view of the facts presented, it seems therefore that the latter well describes the existing defects of tenure systems of the group ranch in Kongolai and the part of Chepareria under trust land. Whereas the former more or less illustrates the case of the privately held part of Chepareria. Thus it is interesting to detect some of its prominent implications on organization and operation of activities in terms of crop rotations and fallow systems and the tendency towards livestock reduction.

The group ranch

In reality, the intension of the formation of the group ranch, as noted earlier, was to induce pastoral nomadism (an extensive livestock rearing) to a more market-oriented livestock rearing enterprise through systematic rules of husbandry and herding, operated in many enclosures so as to overcome times of feed shortage and as well to avoid careless destruction of the bio-ecological niches of the group ranch.

Evidently, the objectives rule out an explicit policy or internal organizational guidance concerning crop farming. In effect, land is adjudicated and a title deed is issued. Thereby, allowing them to use the land as a collateral security for loans through the consensus of all members of the group ranch, at least theoretically. Furthermore, dips, dams and boreholes which are partially functioning are constructed. In spite of these facts, I have indicated in chapter 7 that the implementation of neither systematic herding nor other services is near to the desired goal. In short, a traditional pattern and process of pastoral nomadic activities is more or less pursued in a legally limited land resource without a concomitant change in techniques of herding and husbandry.

Consequently, the unappropriated land-use which prevails

in the group ranch and the exertion of population pressure have forced the people to adopt sporadic and rudimentary crop farming to supplement livestock as a basis for subsistence needs. It is this feature of crop farming which made it impossible to record some sorts of regular crop rotation systems during the field survey.

One of the common replies to my question on rotation systems was that land is cultivated with local maize or occasionally local maize mixed with beans...for 5-10 years and definitely abandoned in many cases, unless the given land is located in the best zone in the proximity of the Suam river. Yet, even the farming techniques along the bank of the Suam river do not suggest an evolution of a clear system of either land or crop rotation. However, on the whole, it can easily be ascertained that long forest or bush fallow shifting cultivation is the most common technique of cropping visible in the group ranch of Kongolai and the major tasks of cultivation are in the hand of women, while livestock rearing is mainly under the control of men, although women and children often take care of small stock in the vicinity of their dwellings.

Hence, cropping and livestock rearing are not coherently integrated activities. Consequently, the effect on each other's performance is very limited. That is why as indicated in fig. 4.10 the households in Kongolai still have a large livestock herd unit. It is also apparent that those clustered households far away from the centre of Kongolai have more stock and stock well distributed among the neighbouring households. This could be due to more available spatial room for herding and husbandry manipulation. But it should be understood that whatever recorded stock sizes are undoubtedly the outcome of misuse of land resources, reversed circumstances may very likely appear in the future.

On top of this, the paradox of the group ranch in Kongolai is that the best dry season grazing area (the first block see fig 2.7 & 3.7) which has access to the perennial river, Suam and abundant bio-organisms (pasture both in the form of grass and leaves) that should be reserved for periods of shortage, is more and more being occupied by plots for sporadic and rudimentary crop farming operations, and residential buildings of the Kongolai services centre.

Hence, it can be concluded that except for the adjudication of land and construction of dips, few permanent water sources and bush-clearing programmes, the major planned

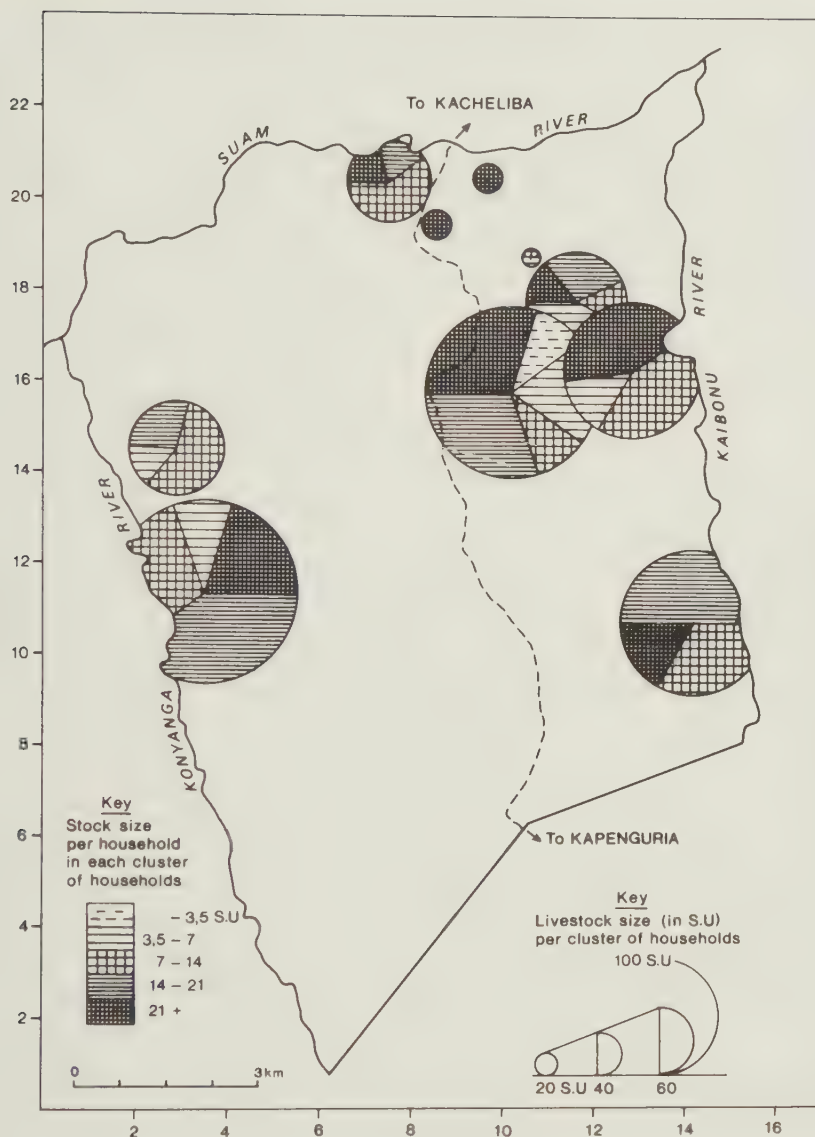


Fig.4.10. Distribution of livestock size (in s.u) in Kongolai.

objectives of the group ranch are not yet implemented.

In a sense, the cause of all the problems indicated above is deeply rooted in the partial implementation of the plan of the group ranch, contrary to its planned objectives which emphasis its organization as an integrated planned development project. In other words, the essence

of the group ranch prerequisites, besides the adjudication of land, a clear guidance of internal arrangements of the activities of its members as well as integration with sufficient external incentives e.g. conducive marketing organization, infrastructure etc...However, it should be clear that without the introduction of internal rules of land-use, the issue on structure of incentives is not at all pertinent. In general, the partial implementation in the form of adjudication of land, provision of dips, dams and other water sources are sub-projects that are doomed in advance. These have already materialized (M.O.L.D. West Pokot 1981).

The trust land

In the part of Chepareria which is under trust land tenure, land is a free resource which is accessible to all members of the community. Records of some of the typical cropping systems disclose 6 years of cropping and 6-8 years of fallow. However, the fallow periods usually are determined by the number of plots used in the cycle (see table 3.10).

Table 3.10 Two cases of crop rotation and fallow system in the trust land of Chepareria .

Cultivation periods	The first case	The second case
1st. year	Local maize	Local maize
2nd. year	"	Local maize X millet
3rd. year	Local maize X beans	Beans
4th. year	Millet or sorghum	Local maize X beans
5th. Year	Local maize X beans	"
6th. year	Millet or sorghum	"

Fallow periods	6-8 years on two plots of land. The fallow years can be of longer duration if, for example, the given household has more than two plots allocated for cultivation.	

Source: The field survey of 1982..

The prevalence of long fallow shifting cultivation is therefore apparent and indicates as well a degree of intensification from 33 to 50 R value*.

The reason behind this is clear as Boserup noted on pre-industrial farmers, as long as land is abundant for cultivation, there is no need for the introduction of new techniques in crop farming and livestock rearing which demand more labour and other inputs (Boserup 1965: 33,41). The same thought could be applied for even those who simply conceive land resources as abundant, irrespective of the actual circumstances of human and livestock populations.

The most astonishing thing is that agricultural characteristics in this part of Chepareria are of relatively higher quality and better developed than the agricultural features depicted within the group ranch, albeit the land is entirely a free resource under traditional tenure system. Firstly, I had easy responses to my question on crop rotation and the fallow system. As indicated above, the crop producers have developed at least a regular and discernable rhythm of cropping and fallow systems over time in two or three plots of land. Secondly, diversification and leguminous crops intermixed or as a single crop is more frequently practised than in the group ranch in Kongo-lai, although among the alternated crops, for example, millet, sorghum and local maize, low quality and draught resistant and low labour requiring crops are included, features which resemble the group ranch cropping characteristics. Thirdly, I have pointed out (see fig 2.9a) earlier that the size of the cultivated land of the people in the trust land is on the whole superior to the size of the land cultivated by the members of the group ranch

* The method of calculation is based on Ruthenberg approach (1980:15-16). Ruthenberg, following Joosten (1962) criterion for classification of the various systems of crop rotation and fallowing by defining the symbol R as the number of years of cultivation multiplied by 100 and divided by the length of the cycle of land utilization (or the sum of the number of years of arable farming plus the number of fallow years), he incorporated the R value to FAO/SIDA 1974 classes of cultivation systems. Accordingly, the long fallow shifting cultivation is defined as having a value of less than 33 R a short fallow system above 33 but less than 66 R and permanent cultivation above 66 R.

in Kongolai.

The most undisputable explanation for its relatively better performances, is its location, vis à vis the privately held area of Chepareria which has certainly influenced the formation of different characteristics of spatial organization. For example, new ideas of cropping and land improvement etc... are spreading from the neighbouring privately owned land. Even interest for private holdings are popular views. In general, the easy access to services and other social amenities prevailing at the centre of Chepareria have an important implication in relatively improving the conditions of the people in the trust land.

On the other hand, the livestock rearing activity has not changed much, of course, animal diseases are much reduced in relation to the past. But, most of the households still have and believe in having a large livestock. The circumstances are clearly indicated in fig. 5.10.

Such circumstances can be expected with regard to the existing tenure system. As a result, each individual household attempts to maximize the exploitation of the accessible bio-ecological niches and to increase its livestock holdings without considering at all the manner of exploitation of their neighbours. Of course, the result is destruction of the basic factor of production.

This problem is already visible in the physical space. The Kenyan government also seems to have realized the endemic problem because a new tenure system is proposed (see fig. 2.5). However, one should bear in mind that the land tenure constraint is not the only barrier which crucially influences the development of this marginal land. Once the problem of this defective tenure is tackled, then the problem of how the internal farm organization is integrated to a structure of incentives becomes a key issue in determining the trends of the socio-economic development of this area.

The private land

The systems of crop rotation and fallows prevailing in the privately owned holdings of Chepareria are prima facie evidence of relatively high agricultural intensification. From the point of view of my field observation, the shifting cultivation system seems to be substituted by short fallow and even by an annual cropping system. In any case, my limited records on crop rotation and fallows periods

indicate that all the farms have crop rotation and fallow system of an R value of above 33 per cent intensification. The cases in table 4.10 are excellent illustrations of the most typical systems. These typical cases suggest that the scarcity of land in this part does not allow long shifting cultivation technique. On the whole, I am certain that the degree of intensification in the privately held area varies from 50 to 100 per cent. However, those who reached 100 per cent intensification level or who adopted the annual cropping system are very few and relatively well-off families e.g. the chief of Chepareria.

At this juncture, we have to be very careful in interpreting the R value of this marginal area. For the achievement of 100 per cent intensification in the marginal area would undoubtedly be more laborious and demand other inputs

Table 4.10 Some typical cases of crop rotation and fallow system in the privately held zone of Chepareria..

Time	1st. case	2nd. case	3rd. case		4th case
	(in a parcel)	(in one parcel)	(in two parcels)	(in two parcels)	(in one p.)
			A.	B.	
1st. year	H.maize	H.maize X beans	H. maize X beans	Sunflower	H.maize X beans
2nd. year	"	"	"	"	"
3rd. year	Beans	Fallow	Sunflower	H.maize X beans	Beans
4th. year	H.maize	Fallow	"	"	H.maize x Beans
5th year	Fallow (natural grass)	H.maize X beans	Fallow	Fallow	Fallow
6th year	"	"	"	"	H.maize X beans
7th	"	Fallow	H.maize	Sunflower	"
8th	"	"	"	"	Beans
50 % intensification			66%		80%

Source: The field survey of 1982.

than in a land of higher fertility (Brookfield 1972:42-43, Turner II et al 1977:392).

To put it in another way, the actual level of intensification recorded in the privately held area of Chepareria should be regarded as a high level from the point of view of its marginal environmental conditions. This means it goes without saying that it has reached the level of requiring more integration of livestock with cultivation, that is, a change in herding and husbandry systems e.g. replacement of large livestock by small qualitative stock and further intensification of cropping including fodder production through better manuring, water control, introduction of more effective tools, preservation of fodder crops etc...

As often anticipated during the process of intensification, some changes in the behaviour of livestock rearing are clearly visible in this part of Chepareria in the form of better care in undertaking livestock husbandry and herding, in securing supplementary fodder e.g. crop residue and in attempting to reduce stock number. The majority, for example, are livestock of less than 10.5 S.U including some sheep and goats which roughly constitute 20 per cent of the total holdings. A few have even less than seven stock units (see fig. 5.10). These figures are indeed very low in relation to the predominant livestock size both within the land under the group ranch and trust land. This variation in herd size has direct bearing upon restricted versus easy movement of herd in the given sub-regional spaces.

In addition, I have already indicated (see page 121) that they have a selective husbandry system. For instance, cattle and sheep, the grazers as a unit herd which can be easily handled in crop farming areas, are much widespread compared to the situation in the group ranch.

In general, it can definitely be said that the inhabitants have profound information on their holdings and the environmental resources in which they make a living. The conditions of a more healthy habitat have placed the private owners in a more advantageous position in the respect that they are able to exploit the accessible resources in a much better manner, although it is difficult to state that their actions have no negative effects on the maintainance of the fertility of the soil.

Relatively speaking, an intensive herding and a more preferable husbandry system have emerged in the freehold zone of Chepareria. Nevertheless, this should not be inter-

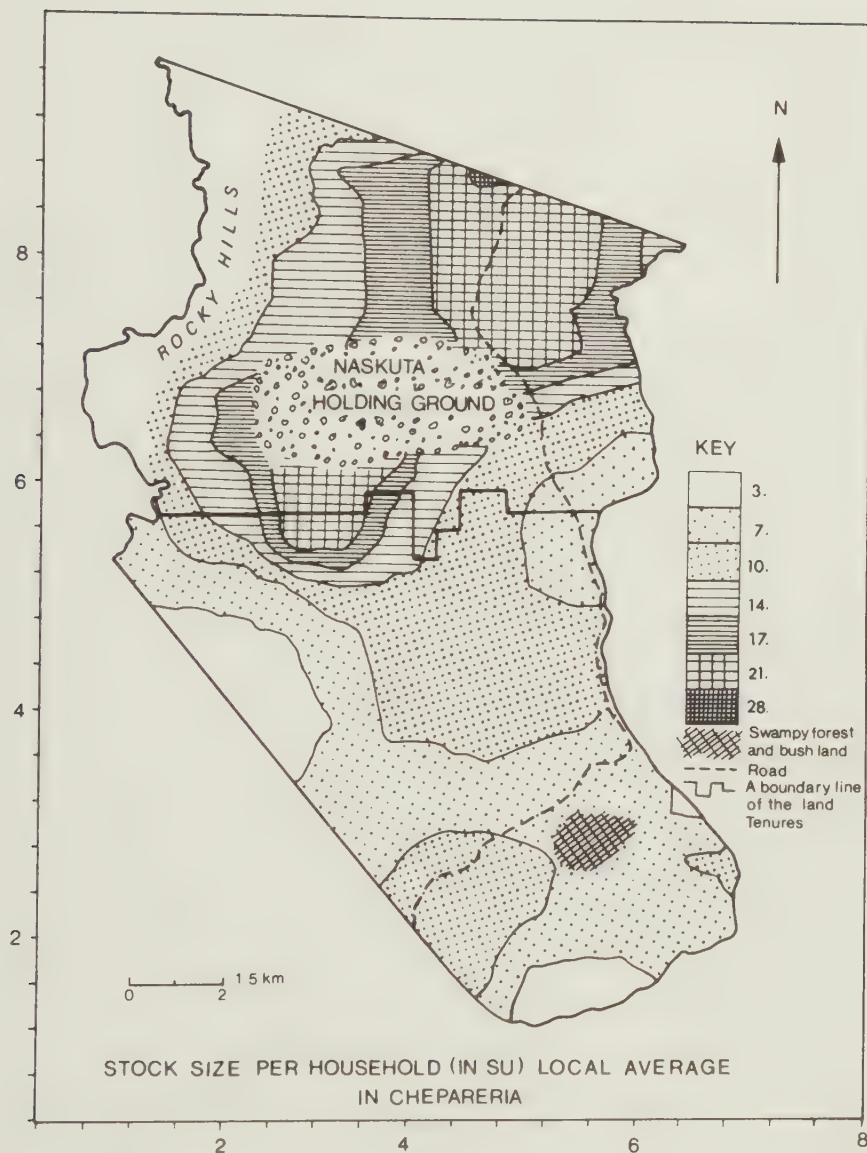


Fig.5.10. Livstock size per household (in s.u), local average in Chepareria.

preted as implying that this system has led either to reduction of stock to an acceptable level or to an introduction of high quality stock which is compatible with the on-going process of intensification of agro-livestock production. What are then the barriers to the progress of the on-going intensification process? Are there sufficient external incentives that can be regarded as an impetus to reduce stock, to intensify and expand cultivation or to establish a harmony between the organization of resources and operation in order to pursue a viable activities system? These are not simple questions that can be answered by scrutinizing only the farms' organization from an internal point of view. What is necessary at this point, is to find out the implication of the external structure of incentives in directing positively or negatively the trends of development in this marginal sub-region.

11 STRUCTURE OF INCENTIVES

INTRODUCTION

In the foregoing discussion, it was concluded that the continuity of intensification and improvement in the productivity of the land, that is, organic integration of livestock rearing and crop farming, was the first and most essential issue for solving the present set of problems (e.g. reduction of risks involved in the present system of activities) confronting the families in the freehold zone. This organizational and performance issue is in turn a function of, and largely defined by, external incentives. Therefore, while lack of incentives will put severe limits on what can be achieved in the way of a viable mixed farm economy, sufficient incentives, in contrast, enhance the on-going intensification process.

In this district, the agro-pastoral nomadic people have traditionally produced for domestic consumption. Today, the essence of the production is basically determined by a defined tenure system and a population pressure which makes the technical components of organizational and performance of activities the most central issue, if the agro-livestock enterprise is contemplated in sound economic terms. Thus, production must be oriented first and most importantly to the commercial market and the progress of further integration into the national economy should be accelerated in order for individual or group farmer(s) to pay for technical innovation costs and continue the on-going intensification and improvement in the productivity of the land in question. In other words, in the actual circumstances a mere production for subsistence is untenable.

Before exploring further the problems of structure of incentives, four constraints of the smallest socio-economic unit (a household) in transition can be isolated:

- i) The scarcity of land resource as a result of the new law of tenure and population pressure.
- ii) The need for expansion and intensification of cropping to improve the productivity of a farm so as to make availa-

ble sufficient food and even surplus.

iii) The reduction in fallow and pasture land is a subsequent action which in turn requires a reduction in low quality stock, eradication of animal diseases and in the long run, introduction of qualitative stock.

iv) The physical bio-ecological environment and the cultural background of the people enforce preferably mixed farming, as an ultimate goal.

In light of these circumstances, it seems necessary to understand that both food crops, livestock and its by-products can be not only a source of food but also a source of income. However, like all smallholders in Kenya, in this case as well most of the crop production is consumed domestically, although a limited amount of hybrid maize and beans is sold through the C.M.B agents, the local cooperative societies and the informal marketing system, that is, the local market (West Pokot Annual Report 1979, 1980, 1981). Thus, livestock and its products are actually the major source of incomes at present and most certainly will be in the near future. But, this should not be interpreted as implying that less emphasis should be placed upon cropping. In contrast, it has been argued earlier that a better performance in livestock rearing prerequisites a better performance in cropping, particularly in the framework of the existing law of tenure.

There are also researchers who argue that an achievement in cropping leads to further investment in livestock (Brandström, Hultin, and Lindström 1979, Sörbo 1977). It is true that such practices of agro-pastoral nomads have been recorded in different marginal areas. However, it should be noted that it is always associated with the accessibility of abundant land resources often under a communal tenure system. For instance, remarking on the behaviour of the Barbaig of Tanzania Kjoerby wrote:

"A few rather wealthy Barbaig who were able to disperse their herds on several homesteads inside and outside the village area, were however, able to maintain their presence in the village and increasingly came to dominate village affairs....Profits were divided among the farmers and village leaders, a few of whom were in a position to expand their livestock holdings by investing the profits from the village shamba in cattle (1979:37)".

Where the prevalence of the same circumstances in part of West Pokot is apparent such behaviour is still regarded as rational. But in a situation where land is extremely scarce resource, particularly due to the introduction of a private ownership system, the expansion of livestock disassociated from the size of a holding is unthinkable. Yet, some households which are supposed to start reducing livestock and replace them by qualitative smaller stock, may not have initiated this process and they may be forced to maintain low quality stock units which may not commensurate with the land size at hand and the technique utilized. Nevertheless, this indicates in reality the stagnation of the shift toward mixed farm enterprises as a result of a defective structure of incentives, and at the same time a prevalence of exertion of pressure of human population rather than a mere love of increasing the number of their livestock units.

On the whole, the scope of the structure of incentives is very broad and complex. Particularly in Kenya, it involves the various marketing organizations, extension agents, cooperative organizations, supply of credit, means of transportation, storage and processing facilities, the non-agricultural sector, the impact of the national economy as a whole, governmental policy etc...Therefore, the detailed assessment of this broad and complex subject is outside the scope of this study. What it aims, is simply to give a brief account of the marketing system in association with the major marketed agricultural product in the area studied, which influences crucially the allocation of resources, the pattern of operations, and the readiness to innovate on the part of the socio-economic units. Hence the scrutiny of livestock marketing (which is the major marketed product) is believed to give a general view on the existing structure of incentives. Thereby, a synopsis of the actual process of development can be attained, on the basis of which we may even be able to hint at the opportunities and constraints facing the people in question in the near future.

LIVESTOCK MARKETING AND ITS EFFECTS

Before advancing on the matter concerning how livestock marketing affects the pattern and process of allocation of resources in the agro-livestock enterprises in the area studied, it is essential to trace the evolution of

the livestock marketing system briefly and depict its implication in the rural geographical space.

Since colonial times, the essence of the evolution of the Kenya agricultural marketing system as a whole, is a product of the monopoly of a set of institutions which are quasi-public, quasi-cooperative, quasi-private and quasi-company (Ley 1975, Raikes 1981, Heyer 1976). For instance Leys, stressing the more or less total coverage of the system of the colonial economy in rural Kenya, remarked that "it is much easier to indicate where there was a degree of competition than where there was monopoly" (1975:33). Apparently, the objective of creating this regulation and controlling system of marketing was to protect the enormous privileges of the settlers.

What is interesting is that in the post-independence period, the policy-makers seem to be ardent supporters of this regulation and controlling system of marketing rather than relying on a free market force. One of the recent studies on livestock marketing remarked on this issue in such a way:

"In the case of beef and slaughter stock almost all legal primary markets are owned and operated by the state or parastatal bodies and there is in addition a large body of legislative controlling how, where and when stock and produced may be moved....The whole structure of livestock sector (and of the economy in general) is thus in large part a result of such controls...What it is quite clear is that there has never been in East Africa/Kenya and Tanzania/ anything remotely resembling a "free market", since even those prices which were not controlled were strongly affected by the large majority which were" (Raikes 1981:189).

Many reasons were given to justify this course of actions (Cf. Ley 1975:38-39)). However, there can be little doubt that the main motive was to correct the inequality of economic growth which was discernable in the geographical space just at independence time through the strict guidance of the statal or parastatal institutions. Whether this strategy is a good means to an end, especially in the late seventies will be seen in due course.

In any case, most of the extensively arranged set of marketing institutions are still preserved bearing the old name or under a new name. Consequently, the parastatal bodies such as the Kenya Meat Commission (K.M.C) and the

Kenya Cooperative Creameries (K.C.C) still have a monopoly privilege on marketing of livestock and produce particularly in the highlands of Kenya. The export of these products are entirely under the jurisdiction of K.M.C.

The African Livestock Marketing Organization (ALMO) which was established in colonial times to purchase livestock from the marginal areas and to supply KMC with cheap cattle, has been replaced by the Livestock Marketing Division (L.M.D), a branch of the Ministry of Agriculture (F.A.O:1972, von Kaufmann 1976). If it has not effectively maximized its power today, it has at least the old responsibilities and privileges. Since the early seventies, LMD has been strengthened by considerable financial aid from the World Bank and IDA together with USAID, SIDA et al, by which a chain of stock routes and holding grounds equipped with adequate grazing, watering and disease control facilities have been made available for the movement and marketing of livestock from the marginal areas (SRDP-OP 12 1975, Livingstone 1978, 1981). As part of this programme of building infrastructure, West Pokot today has a set of holding grounds and other facilities (see fig. 2.5).

In accordance with this strategy, prices of these products are fixed by the state at all points of exchange in the marketing chains (Heyer 1976:314). It seems then, that the Kenya government has taken the responsibility of controlling prices at farm-gates and towns so as to promote operational efficiency, distribution of inputs or on the whole to spread better resources of allocation behaviour in the rural geographical space.

Boserup referring to those developing countries which have adopted this strategy to encourage the application of modern inputs particularly in rural societies under population pressure, argues that restraining the increase in food prices in towns in such a manner is beneficial, but she reminds us as well to bear in mind the sine qua-non requirement of an active government participation, simultaneously to improve the ratio of prices of inputs and outputs at local level through effective allocation of a large share of public revenue and public investment (Boserup 1975:263).

In contradiction to this principle, the entire existing regulation and controlling system in Kenya is said to have entailed operational inefficiency and high cost (Heyer 1976:314). Subsequently, the high marketing management cost has also rendered the price paid to the producers far below the desired level (Raikes 1981:198).

Table 1.11 Producer prices for meat (1977-81).

Year	Beef per kg. 4th grade(KMC) (K.sh) *	Liveweight livestock per kg. (LMD, West Pokot) (K.sh) **	Difference (in %)
1977	4.54	1.80	60.4
1978	5.37	2.80	47.9
1979	5.39	3.00	44.3
1980	6.21	3.00	51.7
1981	6.93	3.50	49.5

Source:

* Statistic abstract 1980, 1981, 1982:101.

**The field survey of 1979, 1982- The prices are official figures of L.M.D which purchases livestock on liveweight basis but, re-sells to K.M.C on a carcass dressed weight and grade basis. The difference is justified as cost of marketing. It should also be clear that I compared it assuming that all meat delivered is of grade four, but this does not mean that L.M.D is not getting meat of higher grade from the marginal areas. Therefore, the above table may have given under-estimated figures in certain case.

Table 1.11 gives sufficient evidence of the defective official prices policy by indicating the difference between the K.M.C guaranteed prices per kg to producer for the lowest grade (4th grade) meat and the official LMD's producer prices per kg liveweight livestock in West Pokot at any local level.

The figures compared presented in the above table are composed purposely of different items. This is because the difference between price per kg of fourth grade meat on carcass dressed weight basis and prices per kg liveweight livestock, will enlighten us about the cost of marketing up to the gate of KMC. The result clearly suggests a great difference ranging from 44 to 60 per cent as the cost of marketing during the given period.

Occasionally, LMD buys from the small traders at Kiringet Outspan which is actually the final point in the chain of holding grounds established in West Pokot. Such purchases of livestock occur most likely in order to reduce

the risk of marketing and we can be certain that the prices traders pay to producers are even lower than the standard price of LMD.

Furthermore, the operational inefficiency has even more serious consequences of multiple effects on internal food marketing and input distribution (Bigsten 1982:1) which in turn has a direct effect on performances of agricultural producers. Let me present, then, some of the contemporary problems of internal livestock marketing and input distribution respectively.

SOME PROBLEMS OF INTERNAL MARKETING OF LIVESTOCK

The recent trends in the supply of livestock to the official marketing organizations at the national level indicates a continuous decline. For instance, while 228 thousand head of cattle and calves were delivered to KMC in 1976, it was only 56 thousand head in 1980. That is a decline of almost 75 per cent of its supply. It also implies running the abattoirs below the level of their capacity (Economic Survey 1981:119)

A similar trend is observed in the market control. In 1967, it was estimated that KMC was controlling roughly 60 per cent of the Nairobi market (Heyer 1976:328) but it handled only one-third of the total beef and only 7.4 per cent of the small stock supplied to the same city by 1979 (ibid:119-20)

In other words, the competition by few licensed private slaughter-houses and the illegal tradesmen who offer relatively better meat prices and better marketing services to producers are gaining ground (or dominating), not only in the rural areas as was the case traditionally, but also in the big urban areas such as Nairobi.

Hence, illegal marketing is expanding today besides the official marketing arrangements (Heyer 1976), undermining government earnings which may in turn affect the existing administrative system and future governmental investment in development projects in the marginal areas.

In other words, the official record is by no means sufficient basis for an analysis of the marketing of livestock and products. Information on non-official markets should be made available to highlight the internal marketing of livestock, and such statistics are difficult to come by at this moment (Raikes 1981).

In reality, the root of the major constraints can be

Table 2.11 Movement of marketed animals (1979).

Destination	Cattle	in %	Shoats	in %
KMC	1556	29.06	-	-
Nairobi	-	-	1973	26.15
Nakuru	14	0.26	-	-
Nandi	25	0.47	330	8.04
Bongoma	-	-	21	0.51
Tranz Nzoia	74	1.38	412	10.04
Edoret	-	-	424	10.33
Kisumu	-	-	400	9.75
Dagoretti	-	-	565	13.77
Juju	24	0.45	-	-
Local	3662	68.38	877	21.38
Total	5355	100	4103	100

Source: West Pokot Annual Report 1979 pp.43.

traced back at the local level. For instance, the official West Pokot records indicate that 4088 head of cattle were bought by LMD, KMC, the county council and the stock traders in 1978 (West Pokot Annual report 1978:28-29). Most likely L.M.D., the county council and even some of the stock traders may have re-sold their shares to KMC. Table 2.11 shows that not only the marketed cattle had increased in 1979, but it also shows that the smaller stock were also sources of income and the district had accessibility to markets as far as Nairobi. In addition, around 16 thousands hides, 18.6 thousands of goat skins and 5.8 thousands of sheep skins of value approx. 1.02 million K.Sh. had been exported from the district. (West Pokot Annual report 1979:46).

In view of these records, the West Pokot's contribution of livestock products to other districts through KMC and other official channels can be rated as negligible. Nevertheless, these figures should be considered with great caution e.g Tranz Nzoia being the neighbouring district, functionally integrated with West Pokot, undoubtedly ought to get more than 1.38 per cent of the marketed cattle. For instance, the Ministry of Economic Planning and Development reported for 1963-64 that West Pokot's cattle sales

were 4233. Today, we should expect more than this figure in better marketing circumstances and liberalization of the Pokot people. In any case, we should bear in mind that accounted for in the above table are mainly figures on livestock, which were sold in auction and which utilized the holding ground facilities. Part of the source of these figures could be the district treasury occasional records of livestock sold at the local markets. Thus, it does not include the flow of livestock through the local markets and through the much favoured unofficial channels. In the Second Overall Evaluation of the Special Rural Development Programme (SRDP), the prevalence of a considerable illegal movement of cattle from West Pokot to Elgeya Markwet district (SRDP/OP 12 1975:9-38) was reported. It is also known that there are illegal flows of stock to Uganda. On top of this, illegal trade in hides and skins is noted as one of the existing constraints (W. Pokot Annual Report 1979:45). These are not all, but only the most glaring examples of illegal marketing in the district.

Further strengthening this argument, the SRDP report depicting operational defects remarked as follows:

/The traders or cattle owners/ "reluctance to use the holding ground is apparently motivated by the inconvenience of the quarantine period, which imposes very substantial costs on their operations. The first expense is the cost for the smaller traders faced with limited financial assets, is the cost of tying up his working capital. Quick turnover is vital to the profitability of the trading operations. During the period in which a mob of cattle is held up for quarantine purposes in a holding ground, the trader might have utilized the money to bring two more mobs into the market. The risk of the trading operations, furthermore is directly related to the time that the livestock are in the traders hands. Death from various causes, theft, and other possibilities of loss are all significant elements of risk, and the longer the trader owns the stock, the greater are the chances of such loss. The final cost item is the traders' time and transport. Instead of being able to complete the transaction in a single trip, a minimum of two trips has to be made, with herding and guarding also required for the period of quarantine. Dipping, vaccination and sometimes grazing fees are also payable by the traders, and while these are relatively small,

they are an additional irritant and disincentive to use the facility" (1975:9-39).

This reveals not only one of the elements that incurs the high cost of marketing of the official channels, and indirectly the encouragement of illegal marketing but it suggests as well that the existing market infrastructure in West Pokot limits the small livestock traders' mobility between different local or regional markets and gives the prerogative of the major livestock trade solely to LMD or to the few well-financed livestock traders who act sometimes as agents of KMC. Often, these traders are equipped with heavy lorries. Those traders who operate the illegal marketing belong mostly to this category. Usually, they are well-informed about price differences between different areas and they can deliver the products to private slaughter-houses, directly to retailers or pass them across the international boundary line to reap exorbitant profits.

In short, the lack of adequate competition is evident in the district. In a way, this should not surprise us because there is clear evidence which shows that the problem is well diffused as well as in other parts of Kenya (Heyer 1976).

The L.M.D not only has an unacceptable prices policy, but it also frequently cancels the schedule of livestock auctions in cooperation with the veterinary office of the district. For example, the annual reports of West Pokot of 1978 and 1979 indicate that quarantine had been imposed frequently by the veterinary office for Foot and Mouth disease in different parts of the district at different times in the two consecutive years. Subsequently, few auctions were held. As a result LMD and the other official marketing agents bought a very small number of livestock as indicated earlier.

Besides, since banning or postponement of auctions are carried without prior warning, the producers have difficulty to assess their marketing strategies in relation to the official marketing operation. Which means to say, any livestock producer who is in need of cash from the sale of livestock, has only limited options, that is, a local market or the use of the unofficial channels of the marketing system.

However, it should be understood that I am not advocating a system of non-control of animal diseases. What I would like to stress here is that, since the spread

of disease is at large even with this excessive system of control, the efforts most likely would have been fruitful if attention is paid to the circumstances at the producer-gate level rather than undertaking controls during the process of marketing. In a way, the eradication of livestock diseases in these areas cannot be separated from the improvement in the general standard of living of the people in question.

In view of these facts, it cannot be ruled out today that there are insufficient market incentives that can be regarded as an impetus for a continuous flows of livestock and products to deficit areas through the proper marketing channels. In reality, the existing marketing system has become an instrument for the prosperity of the few who run the illegal market. For, the yardstick for their offered prices is still the low standard prices of LMD. Therefore, it is plausible to say that the strict regulations and control have lead neither to improvement of livestock marketing in the marginal area nor allowed free competition.

SOME PROBLEMS OF INPUT DISTRIBUTION

In a sense, input distribution is unseparable from the operational efficiency or inefficiency of the producers' output marketing organizations. Inefficient operational organization obviously will reduce the accrued benefits to the producers to a minimum or nil level, which implies the capacity to purchase farm inputs and even the interest to invest more labour to increase the productivity of a unit area will be highly restricted. Particularly in Kenya, since institutions which are engaged in produce marketing are also partly distributors of farm inputs e.g. The Kenya Farmer Association (K.F.A), the cooperatives societies, we can be certain that there is a high cost of operation besides, the basic cost of manufactured inputs. The general circumstances of input distribution has been described by Heyer as follows:

"Kenya suffers from fairly severe input distribution problems in the small holders areas, less severe problems in the large farms' areas, but everywhere inputs are being supplied at relatively high cost (1976:353).

It is unlikely, therefore, that the circumstances will be different especially in the marginal areas. In any case, the survey indicates that limited purchased inputs are used during the survey period e.g. a small quantity of fertilizers, seed (hybrid maize, beans etc...) and small tools. Few producers also pay cash for hired tractors and hired labour. Besides, many farmers, particularly in Chepareria, have been producing hybrid maize for some years and they regard their seed as improved. Therefore, seed saved from one's own crop and occasionally purchased from the local market, account the major supply of this input. Other crop seeds, such as English potatoes are usually made available through the cooperative societies as part of the existing credit programmes for producers around Kapenguria. But due to inefficient transportation systems, all the potatoes which were allocated for West Pokot had been damaged before they reached the societies (W. Pokot Annual report 1979).

In 1979 only 8 per cent of the producers of Chepareria were reported as using chemical fertilizers, but local fertilizers such as dung of animals and other traditional methods are highly diffused techniques as indicated in an earlier section. This is not because, particularly in the freehold zone, that they are ignorant of the importance of chemical fertilizers.

Perhaps, this may also seem to be due to the incapability of the producers' economy to generate enough capital for such objectives and one may conclude that lack of credit is the key impediment to the introduction of externally purchased inputs or new technology in general. This view has an element of truth in it. But, this should not obscure the basic condition required for small farmers' credit programmes. It has been repeatedly stated in development research that agricultural credit is an important resource to improve the productivity of a given farm, if only used to provide sufficient output which pay back all cost of service, loans and in addition leave a surplus which can be reinvested again in the same agricultural enterprise. Thus, "credit will not provide sustained increases in income-earning capacity for the rural population" without an acceptable internal organization and a strong incentives from marketing prospects. (Moss et al 1976:162) In a sense, the internal farm organization and marketing prospects are inseparable.

In West Pokot, the accessible small farm credit programmes can be sub-divided into two groups. The credit

which is available through the Agricultural Finance Co-operation (A.F.C) and the Cooperative Bank of Kenya (C.B.K). The C.B.K reaches the small holders through the two schemes a) The integrated Agricultural Development Programme (I.A.D.P) and b) the New Seasonal Credit Scheme (N.S.C.S), while A.F.C provides credit only through N.S.C.S. All loans are delivered through the local cooperative societies. Yet, it is only the IADP's loans which reach the smallholders within the freehold zone, in Chepareria via its cooperative society. The members who received this service in 1979-80 were no more than two hundred (W. Pokot Annual report 1979, 1980, 1981). Credit programmes were also made accessible theoretically to ranch members after the adjudication of their land, but in practice it has never materialized at least up to 1982.

Nevertheless, the most interesting aspect of these credit programmes is that even the credit which was distributed to the few privileged farmers, was not released in time when it was mostly needed during the peak of agricultural season (W. Pokot Annual Report 1979:22).

The credit programmes in W. Pokot, furthermore, can be criticized from different points of view. For example, first its accessibility is limited to a small member of the smallholders. Secondly, its programme does not consider the local circumstances, instead it follows the principle applied in the highland area, that is, encouragement of cash crop production. It does not recognize that a smallholder's animals are an integral part of his subsistence-cum-marketing strategy. Hence, the credit programmes should have been a means by which the farms' resources allocation is geared towards improvement of pasture crops so as to increase the forage resources of the smallholders, accessibility to better breed-calves etc...This in turn would have opened a new option to reduce significantly the fallow periods and further land would have been made available for intensive agriculture. Simultaneously, the improvement of pasture crops can be a measure of checking erosion.

Instead, what is noticeable today, is the uncoordinated programmes of the cooperative societies which encourage cash crop production, and L.M.D on livestock herding and husbandry. Thirdly, the inefficient means of transportation of inputs from one of the central depots of the district is a major constraint in input distribution as a part of credit programmes. These examples suffice to indicate the existing bottleneck in relation to credit programmes.

However, even a creation of an excellent credit distri-

Table 3.11 I.A.D.P'loan to Chepareria Farms cooperative Society (1978/79).

Loans given to farmers	amount (in K.sh)	%
Loans (in cash)	63839.15	89.57
25 X 50 kg. S.S.P per 62.95 K.sh	1573.75	2.21
7 X 50 kg. A.S.N per 92.45 K.sh	647.15	0.91
4 X 25 kg. D.D.T 5% per 53.90 K.sh	215.60	0.30
Cash balance from ploughing	5000.00	7.02
Total	71275.65	100

Source: West Pokot District Annual Report 1979 pp.23

bution system under the present conditions cannot be a stimulus for introduction of new technology unless the existing inefficient internal producers' marketing operations are changed to high conducive marketing prospects. Thereby making meaningful the effort of the producers in increasing the productivity of a unit land.

In effect, this argument leads us to conclude that the neglect in utilizing purchased inputs, underlines first and most importantly the lack of an acceptable ration between prices of inputs and outputs in the existing marketing system, before even raising the issue of credit programmes. For instance, as indicated in table 3.11 fertilizers and insecticides were made available to fifty members of the Chepareria Farmer Cooperative Society as a part of Integral Agricultural Development Programme (I.A.D.P)' loan scheme. But, the loans in items were not utilized mainly because of high costs.

In general the prices of all purchased inputs have increased more rapidly than the agricultural products recently. Table 4.11 presents an example of the trends in the studied area.

This table shows the index of a Kg of A.S.N. has increased by 81 per cent since 1979. Whereas, the indexes of a Kg hybrid maize and liveweight livestock increased only by 12 and 17 per cent respectively, indicating a more or less a stagnant change in producers' prices and a rapid change in input prices. These trends are a good illustration of the contemporary unfavourable rate of increases between prices received by the farmers for their marketed

agricultural products and prices they pay for inputs and consumer item.

Table 4.11 Index of producers' increase in the price of maize and a kg. of liveweight livestock and index of one of the nitrogenous fertilizers (A.S.N) input price, 1979-82 West Pokot. (1979=100)

year	A.S.N*	Hybrid maize**	Liveweight stock***
1980	143	106	100
1981	-	112	100
1982	181	112	117

Source:

* & **W.Pokot District Annual Report of 1979, 1980, 1981 and W.Pokot District Land Development Division Standard Guidelines, 1980. Figures of 1982 are personal inquiry from the District Agricultural Office, 1982.

*** Personal inquiry from the LMD (Mwisho farm 1979 and 1982). In 1979, a 50kg. bag of A.S.N costed 92.45 K.sh, a 90 kg. of maize 80K.sh (average official price) and a kg. of liveweight livestock 3 K.sh.

N.B The computed price of fertilizer 1982 does not include the price increment which was suggested in the mid 1982 by the Ministry of Agriculture. So in reality the price of this fertilizer is higher than the one noted here, by the end of 1982.

(no data)

These trends are also strongly marked even at national level. The national index for prices paid by farmers for inputs and consumer goods has been increasing considerably vis à vis prices received for products since 1978. It was reported that the prices of inputs and consumer goods increased by 20.4 per cent, while the prices of output rose by 9.4 per cent in 1982 (Economic survey 1983:115), explaining explicitly the general underdeveloped interdependency between the agricultural sector and the rest of the economy. It is also discernable that the government's objective to establish a structure of incentives

to improve the productivity of the rural producers and to tackle their poverty has not yet been achieved.

Thus, there is enough evidence to conclude that in such circumstances, the smallholders of Chepareria have no opportunity to continue the intensification of their activities so as to integrate crop farming and livestock rearing. The structure of incentives cannot be regarded as an impetus for furthering investment of labour, intensive animal manure or the application of chemical fertilizers, introduction of new implements and amelioration of the organization resources.

In short, the realization of organic integration of cropping and livestock rearing cannot be foreseen in the near future. A radical change in governmental policy on marketing and active participation in investment of capital so as to introduce or to encourage the introduction of new technology in the marginal areas, are the prerequisites for altering the pattern and process of the resources allocation of the smallholders, in a more positive direction.

On the other hand, if the present situation is maintained, the choices left to the people in question are very limited.

As it is now, crop farming and livestock rearing will most certainly be handled separately and a limited amount of animal manure will continue to be applied in parts of the arable land. But, intensive use of animal manure which demands a higher investment of human-labour, cannot be achieved so long as cropping and livestock rearing are undertaken separately.

In spite of this, the principle of cropping may follow the present level of intensification through techniques such as mix-cropping (that is cereals with leguminous plants), selection of higher yield crops, a more systematic crop rotation, better weeding and work spacing. In certain cases, when the situation permits, expansion of cultivation may continue without a major technical change.

However, the risk of accentuating the contradiction between cropping and livestock rearing will not be removed due to lack of major technical and organizational innovations in the existing system. In due time, the cropping will stagnate and the producers may be forced to increase the low quality stock at least temporally. However, since grazing land is limited by the private land ownership system, the sources of fodder are usually, the harvest residue, fallow land, in certain cases permanent fallow

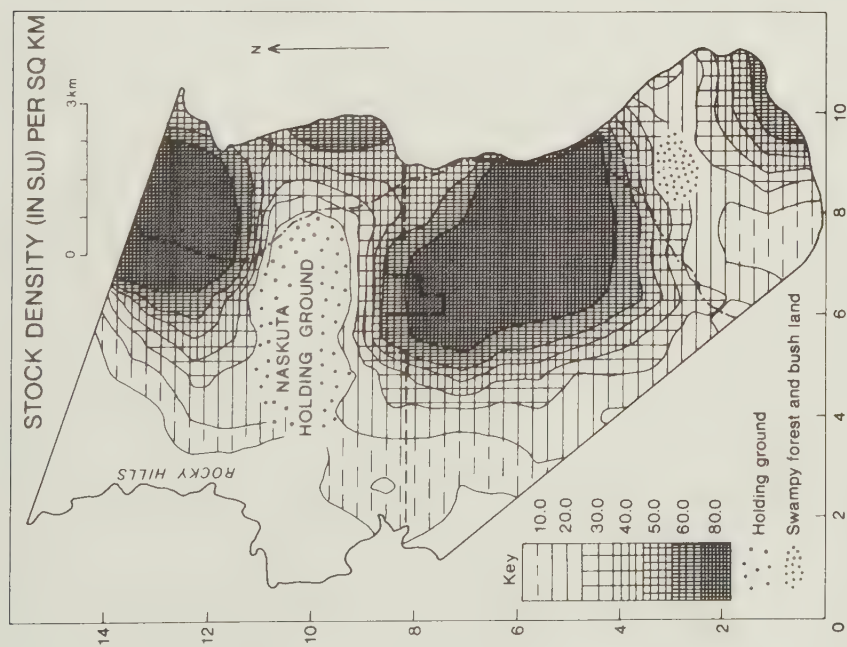


Fig. 1.11. Stock density (in s.u) per sq.km. in Chepareria and extent of soil erosion.



and the public grazing land e.g. forest land. Occasionally, those who can afford to hire herdsmen may send their herds to remote grazing areas. But even this opportunity is not available to all. Today, grazing on other lands demands an advance arrangement with those individuals or groups who claim to be the owner of the land. As cultivation expands, the sources of biotic food for livestock are hard to get. Therefore, even increasing the low quality of stock cannot remedy their problems.

It is also reasonable to find out whether the people in consideration are not only attempting to intensify their agro-livestock enterprises, but also have other options to alleviate the existing pressure on land resources as emphasized by Grigg (see fig. 1.2). It is true, that there is a great interest among the young inhabitants to take off-farm work. But the possibility of such employment is very small, particularly in the vicinity of the farms.

Furthermore, the educational level of the active population, and the already existing unemployed urban population in the neighbouring districts, are not at all encouraging factors for out-migration. Perhaps, the alternative which is available is, migration to the rural areas of the same district where more or less pastoral nomadism "stricto sensu" prevails. This implies an acceptance of disassociation from the existing social and economic services. In other words, it is shifting back to the traditional way of life. Such a trend in development would not easily be accepted, unless, it is the sole choice to avoid starvation.

In any case, the strategy will certainly be to prolong the life of the present level of the agro-livestock activities system as long as possible. But the actual system has inherent problem that cannot be solved without the introduction of new technology which induces both the productivity of labour and land. It obviously calls for a conducive structure of incentives. Hence, the inevitable consequence will be the acceleration of the inappropriate land-use system while pursuing crop farming and livestock rearing which in turn leads to further overgrazing and erosion. In reality, the problem of erosion has already become acute (see fig 1.11). Therefore, a promotion of the development of agro-livestock activities enhanced through a careful consideration of constraints of rules of tenure, farm organization and performance, and structure of incentives are indispensable in changing the course of the actual development.

12 CONCLUSIONS AND RECOMMENDATIONS

At a time, when most developing countries have began to realize the necessity for appropriate planned programmes of exploitation of their marginal land in order to change the quality of life of the inhabitants and to give even spatial room for other dynamic economic activities, we must consider earnestly ways and means of understanding the existing problems of development in marginal zones. In these respects, it has been a tradition for human and natural geographers to make contributions on this subject, albeit a better means of understanding and a solution to the development problems of marginal land is still expected.

The study presented in this thesis has the aim to increase understanding of existing circumstances so as to suggest and provide basic information to planners and decision-makers who formulate new strategies which may be adopted to solve the development problems of marginal areas, particularly of the areas studied.

So I approached the problems from a broader evolutionary course of development and theoretical context by focussing on tropical marginal rural people. In a sense, the discussions look at the problems from two aspects. First, it is argued that the contemporary pastoral nomads are also in the process of packing or intensifying their activities by adopting crop cultivation in addition to livestock rearing. This development is believed to be of high magnitude even in the transitional zone, suggesting the inevitable process of development towards organic integration between livestock rearing and cultivation at least in the future. Secondly, I also believe that the population pressure, (a result of a natural growth, immigration and even the state policies on regional divisions for planning and administrative purposes) is a major driving force for changes in the agro-livestock activities system.

Thus the analysis sets out to test the implication of population pressure on changes in techniques of agro-livestock farming activities in the marginal areas or whether it requires simultaneously, external stimulants both of an agricultural and non-agricultural nature.

Obviously, to examine processes of socio-economic change, the need of a dynamic theoretical and conceptual framework is indispensable. In this respect Hägerstrand's time-geographic model has a dynamic and holistic approach in analysing the socio-technical ecological system. However, due to lack of appropriate data for the model, its use as a complement to the population linked theory of intensification is preferred, believing that it gives us the theoretical and conceptual framework which is badly needed here.

In the existing theory concerning population change and agricultural systems, the work of Boserup (1965) occupies a prominent position. Particularly, her conception of land-use from a dynamic perspective is considered here as a very useful aspect of her theory because it brings fallow land, pasture and animal husbandry under the "port-manteau" of the analysis of the land-use system. This is a key issue in assessing the process of packing or intensification in the marginal zone.

Nevertheless, Boserup's line of thought has also certain weaknesses. The main one lies in her assertion that population density is the only impetus for agricultural intensity. Realizing these weaknesses, Grigg (1980) has offered other alternatives which include in one context, the effects of non-agricultural factors on intensification and also other responses that are available to subsistence farmers rather than continuing to intensify their agricultural activities (see fig 1.2).

Thus the various alternatives available to subsistence farmers are regarded as opportunities or constraints which concern i) farm organization and performance ii) rules of tenure and iii) structure of incentives, which in turn has allowed me to construct a bridge between the time-geographic model and population linked theory of intensification as indicated in fig 2.2. As a result, the group of constraints mentioned is made to be the central issue of the whole study.

Its application in the Chepareria and Kongolai experiences, suggest that it has the capability to increase our understanding of existing constraints and opportunities in these specific marginal sub-regional spaces, and to explain the effects of population pressure on the process of intensification of agricultural activities.

To be more precise, the first strategy adopted is to substantiate whether the areas in consideration are under population pressure or not. In a sense, what is considered

is the relationships between the potential biotic food-webs, livestock and human population in Chepareria and Kongolai. Since the two areas surveyed are within eco-climatic zone IV (Gelens et al 1976), I have adopted the carrying capacity of a unit area of eco-climatic zone IV estimated by Pratt and Gwynne (1977) which is based on the assumption that it is inhabited by pastoral nomadic people who are entirely dependent on livestock.

The result indicates over-population of both humans and livestock. In spite of this fact, the finding suggests that overstocking is just a subsequent response to growth of total population in the two areas studied rather than an act of amassing more livestock for the sake of satisfying their abnormal love for cattle, as some authors intended us to believe. Thus, it could even be argued that there may most likely have begun to reduce the stock per household. In any case, it can be concluded that the majority of households are still way behind the number of livestock units required to maintain their viability, if they are entirely dependent on livestock (see fig 1.6). Livingstone (1981) after reaching to the same conclusion, claims that these people are below subsistence level. On the contrary my analysis endeavours further to see whether the carrying capacity of the two areas has been improved or not by investment of new inputs e.g. in terms of change in agricultural techniques and labour allocation over recent years.

Consequently, it is argued that their spatial behaviour should be the primary factor in indicating such a process of development, particularly in the context of pastoral nomadic situations. But, in the particular areas studied, since the colonial period, their behaviour of spatial mobility has been more and more restricted, leading to introduction and expansion of crop cultivation. Naturally, this again must have anchored their herding activities in space and time within a restricted zone. Today, this constraint is highly maximized by the introduction of new rules of tenure e.g. the herding activities of the private land holders are more or less confined to the neighbourhood of their farms in Chepareria. Whereas in Kongolai, the spatial mobility within the group ranch at least differs in comparison to the traditional system. Therefore, the introduction of crop farming in addition to livestock rearing is an indication that land is made more productive than in the past.

Nevertheless, to understand clearly the improvement

in land resources which has been made recently, further assesment of socio-economic situations at the smallest unit level e.g. single or extended households, is greatly demanded, which implies the farms' organization and performance should be scrutinezed.

As a result, firstly the farms' main attributes, that is, human, livestock, and cultivated land resources are assessed separately in order to increase our understanding of the intricacy of resources organization. Surprisingly, each attribute of the farms, has revealed relevant information on existing constraints and opportunities among socio-economic units. Secondly, a consideration of the three main attributes of a farm in one framework in a simple way highlight many facts. For instance, it seems households with small number of livestock have compensated by expanding cultivation (see fig 7.8). On top of this, it also reveals with increase in size of a household, there is a clear tendency to exploit both sectors of their economy, that is, livestock and crop farmings. Hence, it is feasible to say that the growth of human population incites a higher investment in farming land in addition to livestock rearing.

In spite of these relevant facts, the process of intensification can be fully grasped only through a detailed analysis of farm organization and performances of socio-economic units intertwined with rules of tenure and accessible incentives in their environment.

In line with this reasoning, in the trust land of Chepareria, since a modern rule of tenure has not been introduced, each farm manager still conceived or imagined that there is room for expansion of the occupied land resource, even if technically the resources vis à vis population size are unbalanced (a prevalence of population pressure). In such circumstances, it is unlikely to expect a continuous improvement in land-use system in order to cope with the various difficulties realized, as a result of population pressure.

Consequently, there is a tendency to maintain more or less the traditional pastoral nomadism associated with the most simple cropping system, that is, a long fallow shifting cultivation practice, demanding little input of labour. However, this does not mean that it has no negative consequences for natural resources. In fact, the large livestock which prevail both at household and aggregate level (see fig. 5.10 & 1.11) are sufficient evidence for mis-use of natural resources. In other words,

the innovation of tenure is badly needed in this part of Chepareria so as to convince producers that the accessibility to land resources has been in a real sense restricted by population pressure.

On the other hand, in Kongolai, a group ranch as an innovation of modern tenure, is introduced as a means of promoting rotation of grazing, improvement in quality of stock, and on the whole to prompt a better quality of life for its members. However, the planned package deal is only partially implemented. Most of all, the programme that makes the group ranch adjudication meaningful as an innovation of tenure, that is, a systematic grazing rotation (or an internal rule of land-use) is not yet implemented. Thus, contrary to its ideal objectives, the farm organization and performance of its members have created serious problems that cannot be easily adjusted without radical changes of policy. Today, population pressure prevails on the total land. Yet, the small adjudicated land is exploited by its population without a concomitant technical change in livestock and crop farming. Both the livestock and cropping activities are at rudimentary level.

Therefore, defective rules of tenure in the trust land of Chepareria, and the absence of internal rules of land-use among the members of the group ranch have been impediments to farm organization and performance. In such circumstances, the issue of incentives would not be so relevant to be a major impetus to change of agro-livestock activities in these specific areas.

In contrast, the part of Chepareria which is privately held has a rule of tenure which allows us to make a deep analysis of the relation of population pressure to the intensity of agro-livestock activities. Thus, mapping the distribution of population pressure over the geographical space which is under private holders has taken precedence over the assesment of farm organization and performance intertwined with structure of incentives. The result discerns a completely new circumstances regarding the extent of population pressure. In certain parts, the variations show a wide-ranging gap of 150 per cent in relation to the density given at location level of Chepareria (see fig. 2.10).

In step with these changes, searching for different rural farms' responses to population pressure in accord with Grigg's (1980) line of thought becomes an aspect of great interest. Subsequently, a scrupulous examination

of farm organization and performance of socio-economic units reveals where higher population pressure prevails in the privately held area, there is a discernable tendency to improve the agricultural conditions in various ways e.g. by expansion of cultivated land, by selection of crops of higher yield (see fig. 3.10), by adopting cultivation of leguminous plant in order to preserve the fertility of soil (see table 2,10), by increasing the frequency of cropping over the fallow land and by even reducing the size of stock per household relative to those households under trust land and group ranch (see fig. 5.10).

Finally realizing the fact that the structure of incentives has a cardinal role in strengthening the on-going intensification particularly in marginal zones, I scrutinize it from all aspects to find the actual and future impacts on agro-livestock activities in the area in question.

In effect, it is easy to notice defects in the structure of incentives both at the local level and their inter-relationship to the national economy. Nonetheless, although the inadequacy of incentives is highly stressed, one still cannot avoid noticing the positive implications of the limited incentives, both of agricultural and non-agricultural natures, available to the private holders in Chepareria e.g. a relatively better administration, transportation system, access to cooperative organization and credits, and other amenities.

In line with this study, since intensification of agro-livestock activities is a process of furthering investment in land in terms of labour, organization, technology and other inputs so as to increase its productivity, it should be evident that intensification is a process which is greatly determined by the degree of security of tenure. In the case of a group ownership, the security of tenure provided to all members, should also be supplemented by additional rules which control and direct the internal land-use system of the group owners. These two elements of the tenure system are inseparable so as to make the introduced group ownership a meaningful means for promoting intensification of agro-livestock activities.

There is also substantial evidence which suggests that households or socio-economic units have adopted relatively better techniques of livestock and crop farming where the population pressure prevails in the privately held area. Nevertheless, I cannot avoid having a pessimistic

view on the continuation of intensification of agro-livestock activities in this specific area. For the lack of strong external incentives of an agricultural and non-agricultural nature are discernable in all sense.

All in all, one cannot say that population pressure has not played a role as a spur to change the agro-livestock activities where there is an appropriate security of tenure. But at the same time, I cannot say either that the limited incentives prevailing in the environment have not also played the same role alongside population pressure. In effect, what I have stressed at the end of the preceding chapter is that the inadequacy of external influences in terms of introduction of new technology, improvement in marketing condition of produces and inputs, creation of non-agricultural employment opportunities etc... have weakened the intensification which has been initiated by population pressure. In these circumstances, unless the government comes forward with a radical change in policy on the development programme of marginal areas, it is inevitable that further destruction of the bio-ecological environment and further destitution of the inhabitants will be experienced.

Recommendations

1. The problems of marginal regional spaces can be better grasped in terms of these three interrelated institutional constraints i) rules of tenure ii) farm organization and performance iii) structure of incentives. For instance, in Kenya, it seems there is an understanding of the importance of these three group of constraints, for we see attempts from the government side to tackle these problems. However, unfortunately it is always in a piece-meal fashion. The understanding of the interdependency between these institutional constraints is still a theme not taken seriously by officials who are encharged with the implementation programme of development projects.

2. I believe that destocking measures should be encouraged first among the minority group who own the largest percentage of livestock in both Chepareria and Kongolai.

3. The traditional attitude towards overstocking which stresses the abnormal love of the Pokot people for cattle should be abandoned. Instead, each strategy of a develop-

ment programme should be based on information acquired from the prevailing technical socio-ecological system.

4. To realize the success of a group ranch, the planned programme as an integrated package-deal should be implemented.

5. A change in agricultural conditions in the trust land of Chepareria underlines first and foremost an introduction of modern rules of tenure appropriate to the local conditions which in turn makes the structure of incentives a relevant issue.

6. A radical change in governmental policies on 1) marketing of produce and distribution of inputs, 2) active participation in investment of capital in order to promote agricultural technology or encourage other entrepreneurs to invest in innovations, 3) improvement of education, 4) further improvements in transportation system, 5) creation of job opportunities; are the measures most needed to speed up the already initiated processes of intensification in a more positive direction in these specific marginal regional spaces.

7. The extent of population pressure merits an analysis of great depth, for it is of fundamental importance to identify an area as a core of innovation or an area which requires immediate attention.

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Abbreviations

I.R.S (Integrated Rural Survey), M.O.A (Ministry of Agriculture), M.O.B.E (Ministry of Basic Education), M.O.C.D (Ministry of Cooperative Development), M.O.E.P.D (Ministry of Economics Planning and Development), M.O.L.D (Ministry of Livestock Development), M.O.W.D (Ministry of Water Development), S.R.D.P/OP (Special Rural Development Programme/Occasional Paper), C.B.S (Central Bureau of Statistics).

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Appendix 1.

Pratt & Gwynne base of estimate - Herd structure*		Herd structure in surveyed** areas		
		Chepareria	Kongolai	Average
Cows	45.5 %	43.7 %	57.5 %	50.5 %
Bulls	4.5	9.9	4.4	7.2
Steers	6.9	12.5	7.2	9.8
Heifers	15.9	13.1	11.4	12.2
Calves	27.3	20.7	19.5	20.1

Source:

* Pratt & Gwynne 1977:37

** The survey of 1979

The table indicates a close similarity of herd structure. However, it should be clear that the data which I have compiled were not classified by age and type of cattle as Pratt & Gwynne's study. What is used here, is the classification by type of cattle as is given by each owner of the herds during the field survey. As a result, it was considered as inappropriate to apply the equivalent biomass weight (kg) given by Pratt & Gwynne to each category of cattle to the roughly classified cattle as of the surveyed areas. Instead, the average weight of the total cattle was used. The authors base their estimation on a unit herd which consists of 44 head of cattle which are considered as equivalent to 31 adults equivalent of 240 kg each. 1 stock unit is equivalent to 450 kg (Cf. Pratt & Gwynne 1977:37)

Therefore, 1 cattle = 0.7045 adult equivalent
or

$0.7045 = 169.08 \text{ kg}$

$169.08 = 0.3757 \text{ stock unit}$

$8 \text{ shoats} = 1 \text{ stock unit}$ or $(1 \text{ sheep or goat} = 0.125 \text{ s.u})$

It is believed that the above method provides better information than applying for instance the FAO's conversion

factors - a camel 1.1, buffalo, horses and mules 1.0, cattle and asses 0.8, pigs 0.2, sheep and goat 0.1 (Cf. FAO/Production Year Book, v. 28.1.1974:285). Konczacki (1978) has also used the FAO conversion. The Kenyan stock unit coefficient is a little bit different - a bull = cow/calf 1.0, 1-2 years old 0.4, 2-3 years old 0.6, 3-4 years old 0.8 stock unit. 8 small stock are equivalent to 1 stock unit (Range management Office/West Pokot District). In general, when it comes to the small stock, it seems there is a common accepted conversion factor.

Appendix 2. The detail of the estimated livestock production in (s.u) in the two areas studied.

Year Months	1979											
	Nov./D.	D./Ja.	Ja./F.	F./Ma.	Ma./Ap.	Ap/M.	M./Ju.	Ju/J.	J./Au.	Au./S.	S./O.	O./Nov.
Cattle*	260	273	271	237	282	282	265	285	293	296	298	303
Multiplication factors	260	273	271	237	282	282	265	285	293	296	298	303
	283	271	237	282	282	282	282	265	285	293	296	298
Chepereria	2865	3008	2986	2611	3107	3107**	2920	3140	3228	3261	3283	3338
Kongolai	1942	2039	2024	1770	2106	2106**	1979	2128	2188	2211	2225	2263
Goats*	221	201	208	212	214	240	243	250	236	266	263	263
Multi. factors	201	208	212	214	240	240	240	243	250	236	266	263
Chepereria	378	344	356	363	366	410**	415	427	403	454	449	449
Kongolai	672	611	633	645	651	730**	739	760	718	809	800	800
Sheep	145	133	137	143	163	167	156	169	174	176	181	184
Multi. factors	135	137	143	163	167	167	167	156	169	174	176	181
Chepereria	251	230	237	247	282	289**	270	292	301	305	314	319
Kongolai	169	155	159	166	189	194**	181	196	202	204	210	214
Total Livestock (in s.u)												
Chepereria	3494	3582	3579	3221	3755	3806**	3605	3859	3932	4020	4046	4106
Kongolai	2783	2805	2816	2581	2946	3030**	2899	3084	3108	3224	3235	3277

*Source: The Central Bureau of Statistics, I.R.S 1978-1979 data.

** : The field survey of 1979 (The April/May data is converted to s.u.)

Appendix 3.

The procedures

The gridding technique of interpolation is referred as GINTIP. There are two stages of processing:

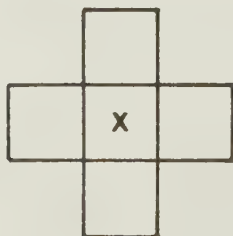
a) Sorting into grid

The grid network of size 16 x 22 cm. was established (on the map of Chepareria); each grid being 1x1 cm and representing 0.56 sq km, that is, 352 grids were established and each data was assigned to its respective grids. For example, from population data, it was possible to determine at this level the following values of any grid.

1. Grid row number
2. Grid column number
3. Total households no. (sampled and non-sampled) of a given grid.
4. The sampled households no. in the given grid
5. The average size of the sampled households in the given grid.

But, to find the estimated population of the same grid interpolation was needed.

b) Interpolation is undertaken by using surrounding quadratic grids in order to get a balanced representation of all directions (see the following figure), e.g. to estimate the population of any grid, the following searching procedure is followed:



i) The computer was made to scan the values of the sampled households' sizes in the nearest four grids (that is within an area of 2.2 sq/km). If there are sampled households in these four grids, the computer will calculate, the average value as an average size value of the given grid. This value finally is multiplied by the total

number of households (sampled + non-sampled) to account the estimated population of the given grid

ii) However, if all the households in these four nearest grids are non-sampled, then it assigns the total average value of the given studied area X, which is again multiplied by the total number of households existing in the given grid.

This procedure is repeated for every grid in turn and each time the computer scanning is carried out within an area of 2.2 sq/km.

iii) Errors correction

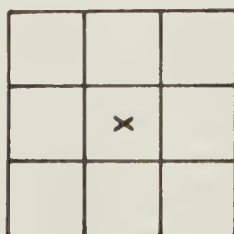
a) Errors which are expected along the boundary due to sudden grids without values outside the area in question, is corrected

b) Since it was known in advance both the sampled and non-sampled households, in the final cartographic work certain grids which are not occupied by households (e.g Naskuta holding-ground) are made to be left blank.

In such a way, interpolation of human and livestock density per square kilometers was estimated in Chepareria.

c) Smoothing

To avoid sharp curves smoothing was performed. While drawing the contour map in Chepareria, a surface is interpolated based on a weighted average of the values of all surrounding grids, e.g. for the maps of density, a weighted average of the values of the nine surrounding grids is used (that is an area of 5.4 sq/km) as indicated in the next diagram.



On the whole, it can be said that the contour map is interpolated by UNIRAS, GINTP and plotted by NAG: Numerical Algorithmus Group Ltd. (Oxford) routines in the programming package.

Location
 Sub-location
 Date of interview
 Household no.

The interview is conducted with ... (1) headman
 (2) other person and specify

A.1 Total number of persons in household

A.2 Headman or related to headman	Age	Marital status	School attendance
1. headman			
2. wife(ves)			
3. son(s)			
4. daughter(s)			
5. father			
6. mother			
7. other relatives			
8. non-relative(s)			

A.3 Does any member of the household have a job in addition to his or her farm activities. Yes No

A.4 If yes, state
 1. operating on other farm
 2. rural non-agricultural activities
 3. employed by the government
 4. specify place, time of the year and duration

B.1 Do you own livestock Yes No
 (if yes, supply the following questions:

Type of livestock	Number	Actual use of the animal	Animal owned outside the farm	If yes specify
		1. breeding		1. stock
		2. milk		friend
		3. for sale		2. relative
		4. for meat		

Young bull
 Bull
 Young steers
 Steers
 Cows
 Heifers
 Female calves
 Male calves
 Total cattle
 Sheep
 goats
 Total small stock

B.2 Give number of milk giving cows
 B.3 Milk yield per cow

(use any unit of measurement which suits to the situation)

B.4 Is there a specific season for allocation of herds? E.g. a period of time for calving, castrating, branding, etc.
 Specify if yes

B.5 Who is in charge of this allocation activities?
 Headman of the family
 Others, specify

B.6 Is there preferable breeding season?
 If yes, what is the controlling technique?

 (i.e. separation of bulls and cows etc.)

C.18 Labour inputs

When did you start and finish preparing land for your specific crop(s) or mixed crop(s)?

Name of crop(s) or mixed crop(s) Starting date Finishing date

C.19 When did you start and finish planting your specific crop(s) or mixed crop(s)?

Name of crop(s) or mixed crop(s) Starting date Finishing date

C.20 When did you start and finish weeding your specific crop(s) or mixed crop(s)?

Name of crop(s) or mixed crop(s) Starting date Finishing date

C.21 When did you start and finish harvesting your specific crop(s) or mixed crop(s)?

Name of crop(s) or mixed crop(s) Starting date Finishing date

C.22 Give the labour inputs of each, that is, preparing land, planting, weeding, harvesting, following the above questions. (D.5 was cancelled out)

C.23 If they cultivate and rear livestock, supply the following questionnaires:

Is there a member(s) of the family (including non-relative) who returned from the herding place to the farming centre, so as to give assistance to crop farming?

a) preparing the land

b) planting

c) weeding

d) harvesting

e) other

If yes, specify

If they are more than one give the no

5. Sunflower a b c

6. Coffee a b c

7. Beans a b c

8. Fodder pasture a b c

9. Tobacco a b c

10. a b c

C.11 Are you buying and using fertilizers on your cultivated land?

Yes

No

Do you use local fertilizers e.g. dung and other?

For which crops?

Bought fertilizers

Local fertilizers

C.12 Do you use insecticides?

C.13 Are you member of a co-operative?

If yes, which

C.14 How often does the extension agent visit you?

Every week

Every month Never Time/year

If necessary give further comment on this space:

.....

.....

.....

C.15 Please describe the crops rotation and fallow system

.....

.....

.....

C.17 Name type of tool utilized

a) hoe Yes No If no, why

b) plough Yes No

c) tractor Yes No

(C.15, C.16, C.17 are information collected during the

second survey in 1982).

C.24 Who take care of the herds at this specific moment?

.....
 specify if he or she is hired labourer.....
 C.25 Give the location of the herds during this period (that is,
 it could be in times of preparation of the farm, planting,
 weeding, harvesting, others)

Give the approximate distance from the centre of the farm
 area.

..... in kms.
 the distance in no. of day/hours etc.
 if it is marked on the map use the symbol
 of the map.

The following questionnaire should be supplied to those
 people who have livestock and who move with their herds
 within a large collective owned land (e.g. group ranch)
 D.4 Do you have immovable properties at the main centre e.g.
 house or whether they have invested in ~~dams~~ and other
 constructions.....

Specify

 D.2 Do the herd of this household move with herds of other fami-
 lies of the same community?
 If yes specify, the names of the headmen of the
 Families

D.3 Give the location of your grazing station of last week.
 Local name or other description
 distance from the homestead

D.4 Do you move in anticipation of better grazing station and
 water places or in response to already existing ones

D.5 If their destination is new grazing spot, what is the
 factor(s) for this movement?

better pasture
 need of water
 conflict

D.6 What are the factors which induced the concentration of
 livestock a specific grazing station?

Water source
 Better pasture
 Residential place of their kins

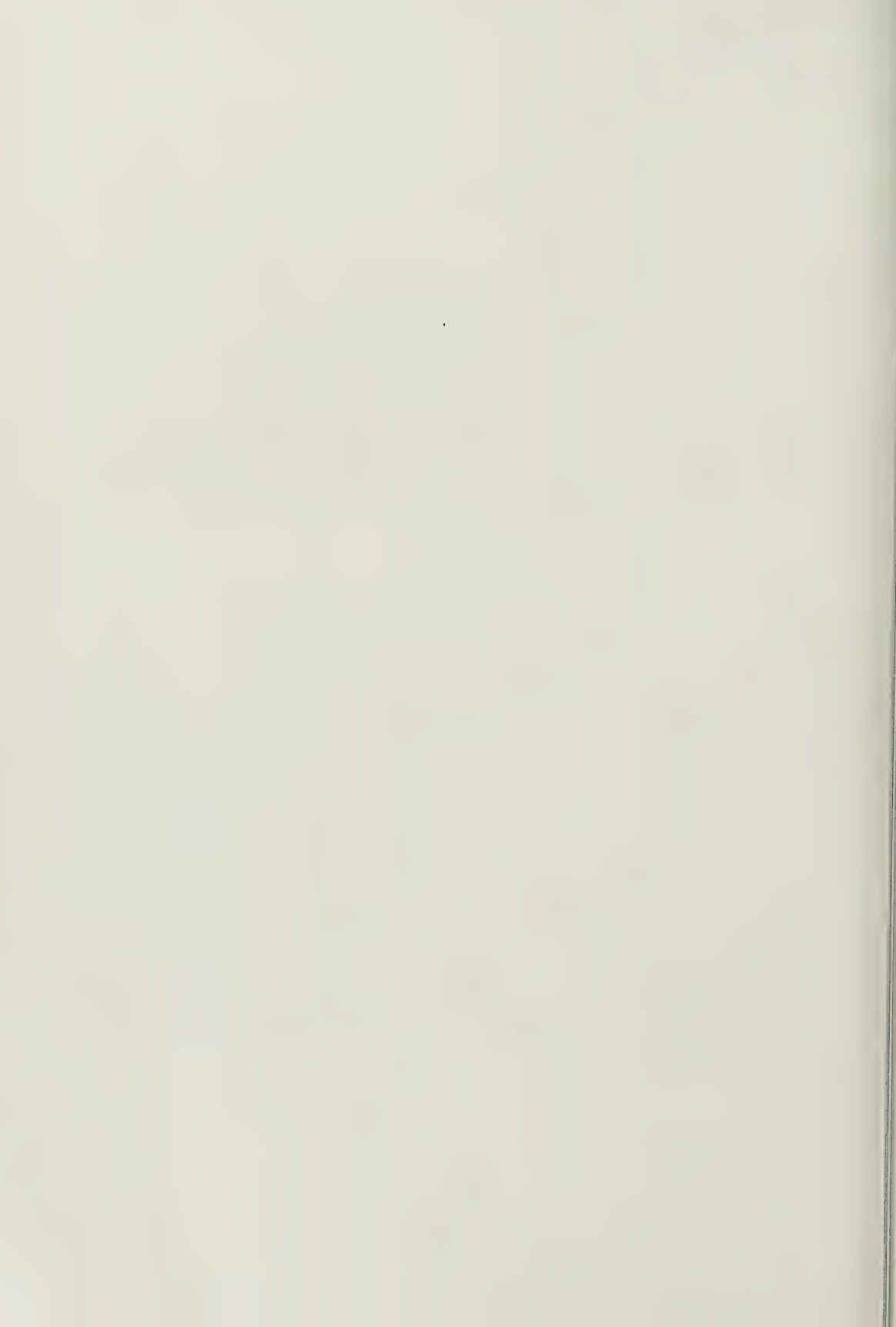
D.7 Are the **domestic animals** watered regularly?

Yes
 No
 If yes, how many times? a day
 a week
 2 weeks

-distance of water source area from the main pasture area

 - if there is variation of watering system with the type of
 herds, specify

D.8 Are you member of co-operative or group ranch or other
 (specify)
 D.9 List some of their major problems in relation to their
 livestock rearing and crop cultivation



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In this research project, it is argued that the contemporary pastoral nomads or agro-pastoral nomads, particularly those located in the transitional zone between the arid and fertile rural lands, are in the process of intensifying or packing their activities. The main factor which is an impetus for this course of development seems to be the exertion of population pressure. Which is actually a result of natural population growth, immigration and change of land policies. The adoption of innovations (e.g introduction of new rules of tenure, changes in technique of agro-livestock activities, investment in infrastructures etc..) and other remedies for these problems, in turn have created new opportunities and constraints which nowadays have encouraged even more the continuation of the process of intensification. In other words, the traditional spatial organization of such societies has been eroded.

Therefore, the theme of this study is to find out the existing constraints and opportunities which guide the on-going process of change among socio-economic units (single or extended households) and the role of population pressure in such dynamic circumstances. Finally, there is an endeavour to suggest how such societies in marginal regional spaces should be organized, the task of the government, education and planners.

